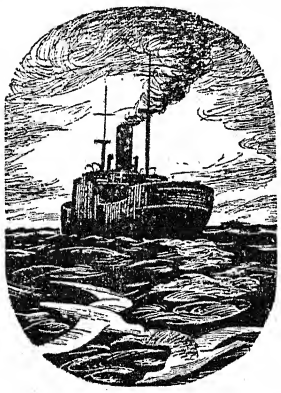
BRITAIN'S MERCHANT NAVY

Edited by

SIR ARCHIBALD HURD

With more than forty explanatory drawings specially prepared by L. Ashwell Wood



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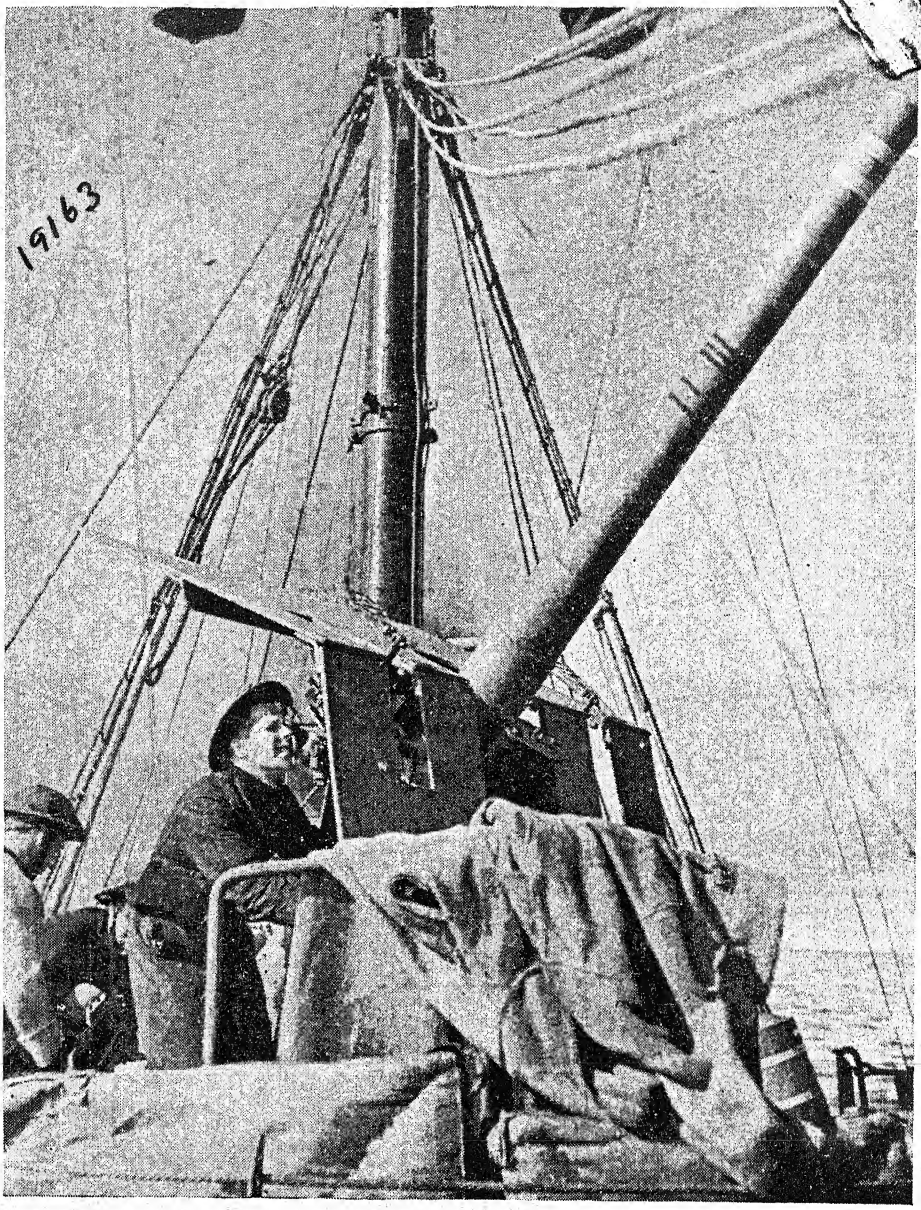

MINESWEEPER'S GUN CREW AT ACTION STATIONS

The work of Britain's minesweepers in keeping the sea lanes clear and the convoy lines open is of the utmost importance to ships of the Merchant Navy. It is carried out unceasingly, day and night, by mine-sweeping patrols, well armed against attack. Many of the crews on these vessels were fishermen in peace time. All round the coasts of Britain these ships keep their perilous watch, seeking out and destroying mines, ensuring the safety of our shipping

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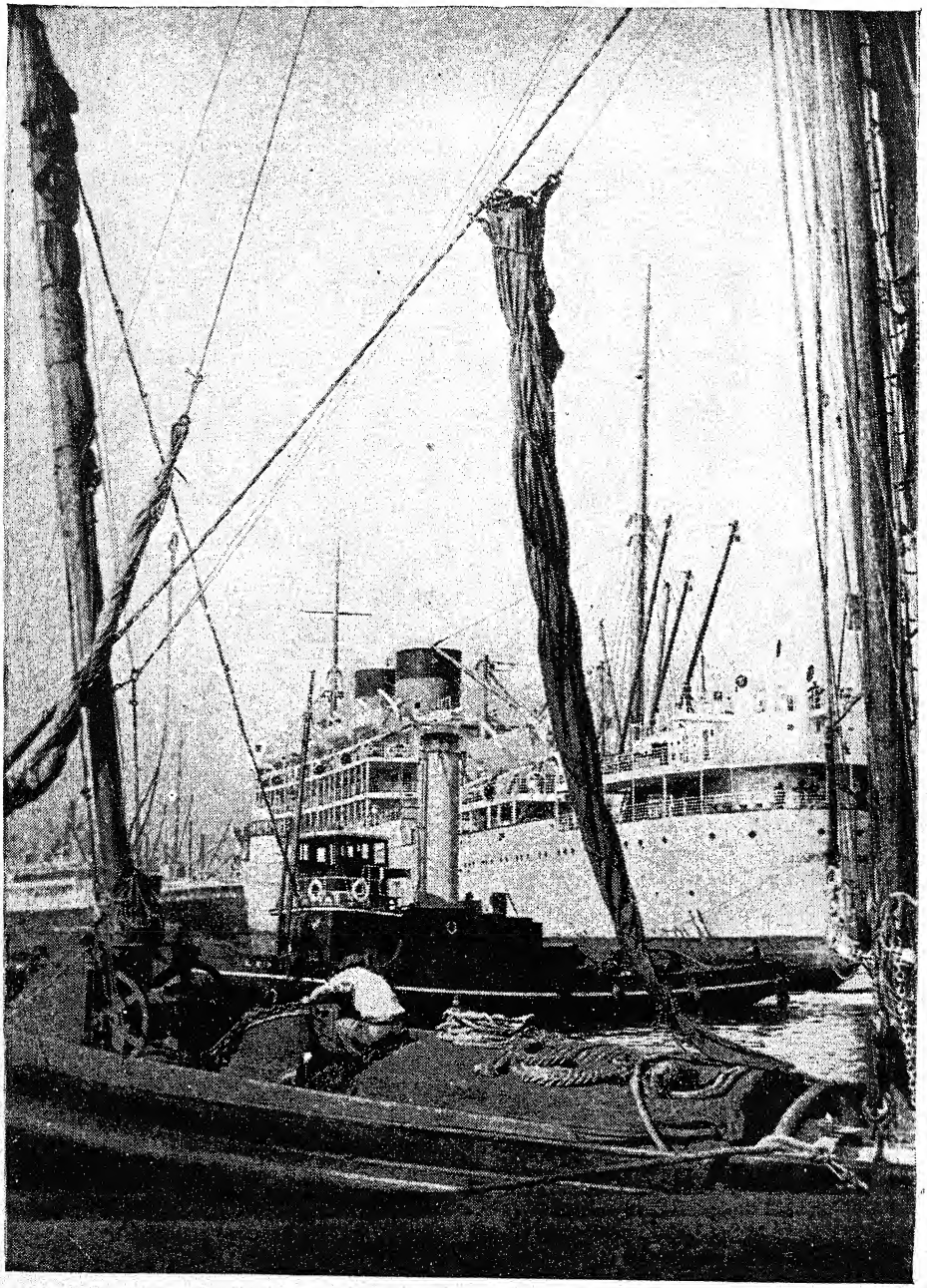


SHIPPING IN THE ROYAL ALBERT DOCK

On the north side of the Thames the Royal Albert Dock and the adjoining King George V Dock comprise the largest enclosed dock water space in the world. The five large docks of the Port of London have nearly fifty miles of quays for loading and unloading goods

CHAPTER 1

Britain's Life-line

Britain's vital need for ships. One year's cargoes—67,000,000 tons. Britain's ships in every port. The enemy's main target. Food and essential supplies. New tasks, new dangers, new weapons. Achievements of science. Heroism of Britain's seamen. New standards of safety. Lifeboats, life jackets and rafts. Orange smoke signals to guide rescuers. Grand work of the convoys. Keeping the sea lanes clear.

WHEN war broke out in the autumn of 1939 Britain possessed nearly 18,000,000 tons of merchant shipping—more ships than any other country in the world. These British ships numbered 9,000, but many of the vessels were quite small—under 500 tons gross—and more than 1,200 of the remainder ranged from 500 tons gross to 2,000 tons. There were only 4,000 of upwards of 2,000 tons gross, for use in ocean trading.

Because Britain is a small island nation with a large population—about 48,000,000 men, women and children—Britain's Merchant Navy was her very life blood.

SHIPS ON EVERY ROUTE

The ships, varying from the 80,000-ton luxury liner *Queen Mary* to the modest but vastly important tramp, were the foundation upon which the whole economic and industrial prosperity of the nation had been built up. From the ends of the earth they came, day by day in a constant stream, ploughing their way through foul weather and fine, braving all the forces of Nature—storms, fog, high seas, hidden currents—and they were handled with superb courage and fine seamanship by British Merchant Service officers. In the year before the second World War, British ships brought to our ports cargoes weighing more than 67,000,000 tons. Think what that meant! Twenty-two million tons were food and drink; 28,500,000 were raw materials for Britain's industries; 9,500,000 were oil fuel, so important in this modern mechanical age.

BRITAIN'S SEA-BORNE TRADE

The remainder consisted of manufactured goods; all sorts of things, which, although not perhaps absolutely necessary, made life much more pleasant for us all.

But if Britain relied upon her ships to bring her all these things, she relied upon them just as much to carry her wares abroad. She needed her ships if she were to sell her goods in the markets of the world, to increase her financial prosperity and to be able to pay for the goods she needed from those who had them to sell.

Thus, there is hardly an industry in the country that does not rely upon the Merchant Navy, and hardly a person whose prosperity and general well-being is not bound up in this vast and complicated organization. It is a vital life-line without which this island kingdom could not maintain her position in the forefront of World Powers—without which, indeed, the people of the island could not live. In times of peace, Britain's ships sailed the oceans of the world upon their "lawful occasions." There was scarcely a port of any size in the world where you could not

see the "Old Red Duster" fluttering proudly in the breeze, not a trade route along whose length a British ship could not be found engaged upon these lawful occasions of her trading, loaded down to her marks with her precious cargo.

THE MEN OF THE SEA

The men who sailed these ships —and there were nearly 157,000 of them at the beginning of the second World War—were a hardy race with the mark of the sea in their faces and the salt of the sea in their blood. Their lives were bound up with the sea and ships. They were happiest when they had left the land far behind them and were out upon the ocean highways, resourcefully pitting their strength against the forces of Nature or sailing serenely upon a placid sea. They were a simple, peace-loving race untrained in the arts of war, who asked for no more than that they should be permitted to get on with their job undisturbed.

Then came the war. Overnight these men and the ships they sailed assumed an even greater importance. The Merchant Navy took its place by the side of the three fighting Services as one of the main bulwarks of Britain's safety.

To the hazards they encountered from storm, fog, or treacherous currents were added the dangers of attack from bomb, torpedo and hidden mine. The Merchant Navy became at once the main target of an unscrupulous enemy who realized that, if Britain were to be beaten, her ships must be sunk or driven from the seas. Foodstuffs and vital war materials, the enemy realized, must be prevented from reaching Britain's shores at all costs.

If the Merchant Navy was important in time of peace, it was doubly important in time of war. Food still had to be brought to feed the population—about half of all the food and practically all the raw materials for factory and workshop—but other calls were made upon the ships and the men who manned them. The Navy lacked sufficient auxiliary vessels; the Merchant Navy had to find them. Luxury passenger ships were transformed into armed merchant cruisers; trawlers became minesweepers.

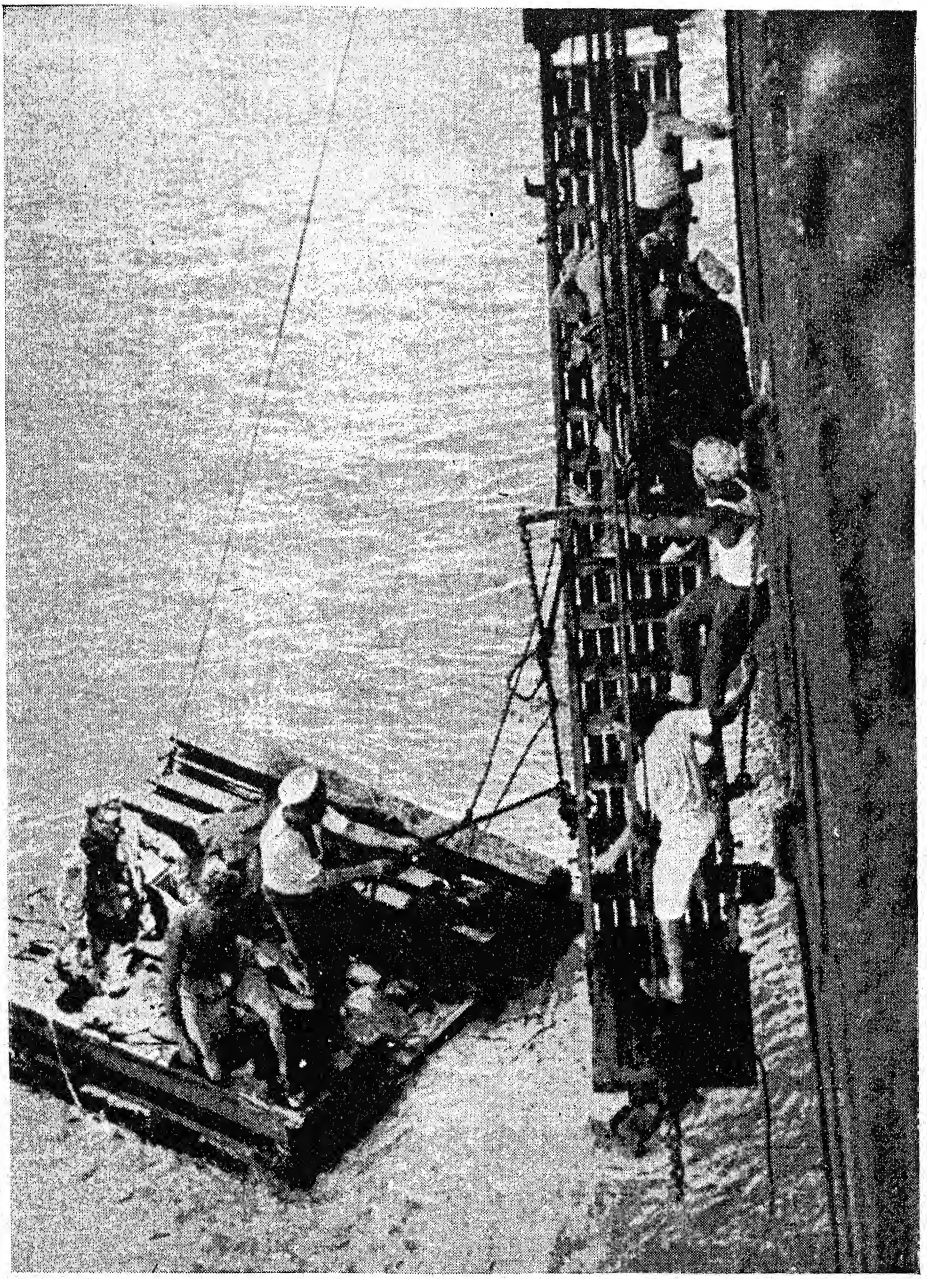
Ships had to be found for the transport of troops and materials of war to all the fronts on which Britain was engaged—the Merchant Navy had to supply them. Not an aeroplane could operate unless it had ocean-borne oil fuel. But the merchant ships had still to carry out their primary function of stocking the nation's larder.

Britain's seamen knew only too well the dangers that they would have to face. In the first World War, Britain's Merchant Navy had lost nearly 8,000,000 tons of valuable ships by enemy action and the lives of 13,000 seamen had been sacrificed, and in those days aircraft were a comparatively new weapon—so new, in fact, as to be hardly worth considering.

GERMANY'S FIRST BLOW

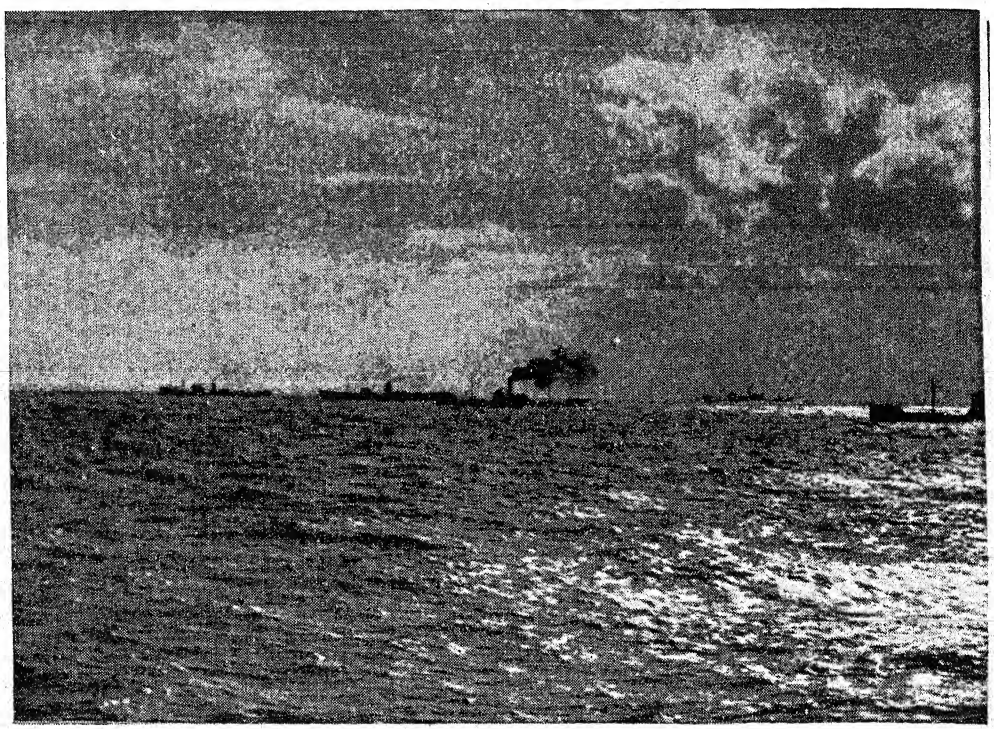
Our seamen knew that in the second World War more deadly weapons would be used and that the sea war of 1914 was only a shadow of things to come in 1939 and after. But they never wavered. With a good ship under them, and by the grace of God and the help of the British Navy, they were willing, and even eager, to face whatever dangers lay ahead. They would show the enemy that his hopes of winning the war by cutting Britain's life-lines were vain.

The enemy was not long in beginning his sea war. Within a few hours he claimed his first victim. With no warning, he torpedoed the liner *Athenia*, outward bound to Montreal with over 1,000 persons aboard, many of whom were women and children. Fortunately all but 112 were picked up by ships that hurried to her assistance. This was only the beginning,



SHIPWRECKED SEAMEN RESCUED FROM RAFTS

Exhausted survivors from a torpedoed merchant vessel are being helped aboard a rescuing ship. They lashed together two rafts and drifted for fifteen days, with no food and very little water, until they managed to attract the notice of their rescuers by flashing tin lids in the sun



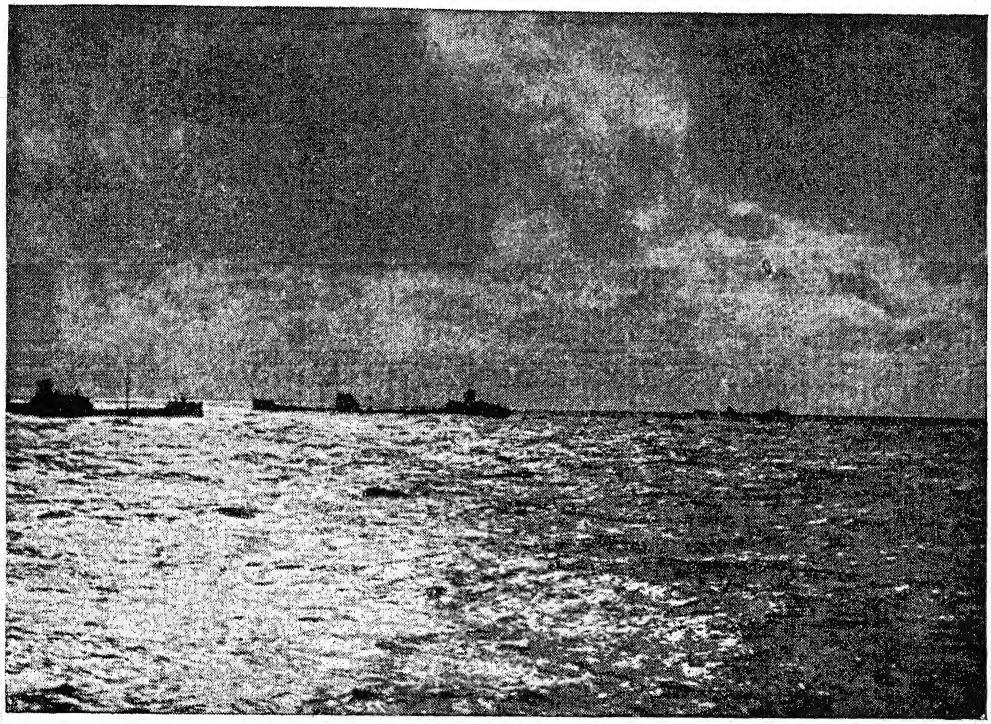
WITH CARGOES OF FOOD SUPPLIES AND WAR MATERIAL CONVOYS

Making the Merchant Navy his chief target, the enemy strove desperately to stop supplies from reaching our shores. His efforts were in vain. In face of relentless attacks by torpedoes from U-boats, by bombs from aircraft, great convoys of Britain's ships sailed continually,

but it was a pointer to the future. It showed that the Germany of 1939 had lost none of the barbarity she had exhibited in the first World War—that she was still a foe who disregarded not only the laws drawn up and agreed to by the nations of the world, but, worse, far worse, the laws of humanity and God as well.

As the months passed, the number of sinkings increased, but the spirit of Britain's seamen did not waver. Added to the dangers from submarines, surface raiders and moored mines, there were new and terrible weapons, the chief of which was the aeroplane. The enemy used aircraft in large numbers to attack merchant ships. Diving out of the sun or cloud, they dropped their bombs almost at mast height, whilst the ships' officers and crews shot at them with any weapon they could lay hands on—rifles, revolvers and even shot guns were used. Later these ships were armed with powerful guns as well as multiple machine guns for defence against air attack. These accounted for many U-boats and numerous raiding aircraft.

Two other weapons were added to the already long list of perils faced by mariners. The first was the magnetic mine, which was detonated by the magnetic field set up by the steel hull of the ship, and the second was the acoustic mine, exploded by sound waves from the ship's propellers. At first, the seamen could make no reply to these weapons. They were sinister robots that struck without warning. But Britain's scientists soon came to the aid of their comrades at sea, and



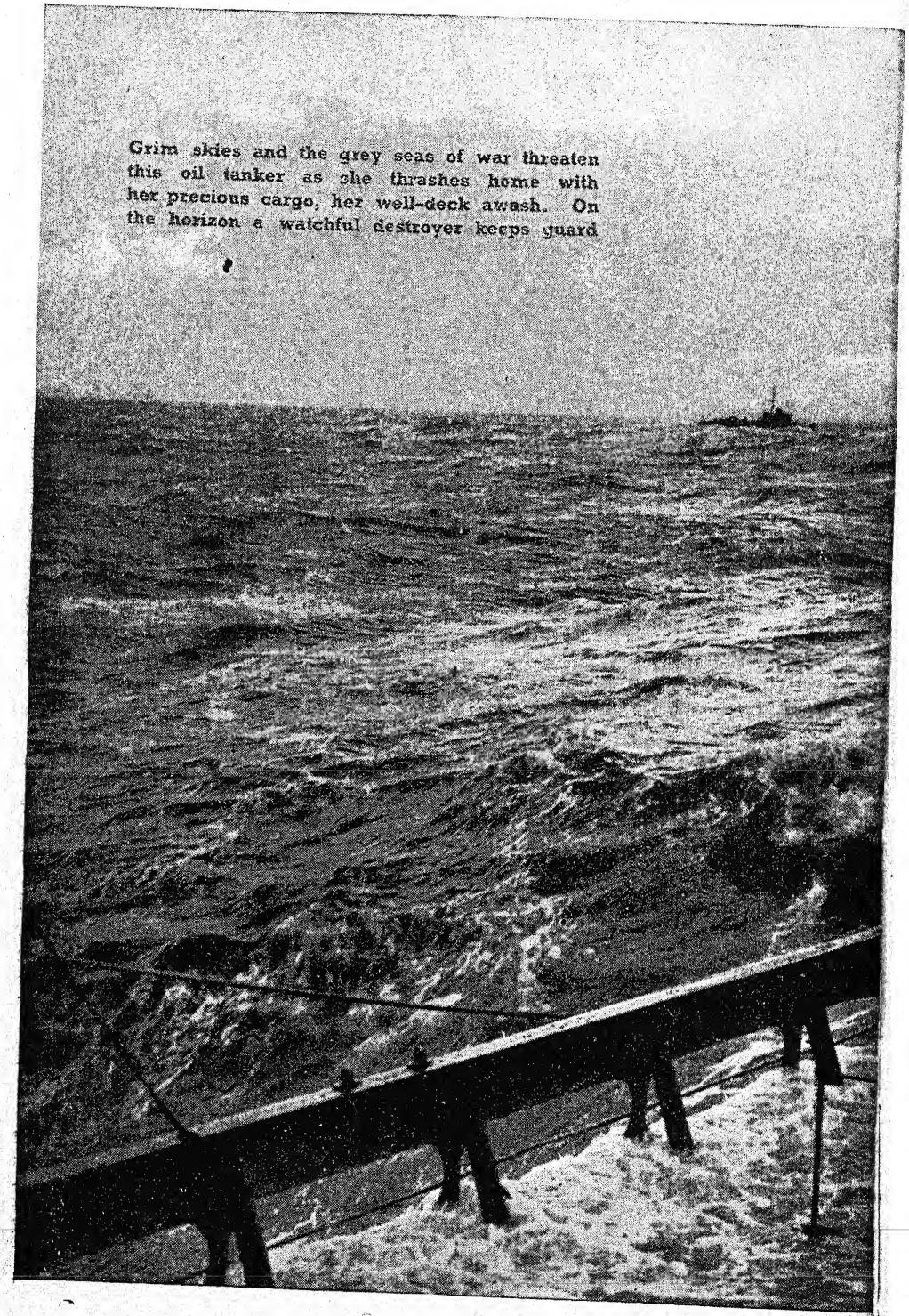
SAILED NIGHT AND DAY TO KEEP BRITAIN'S LIFE-LINES CLEAR
daring every menace and every weapon the enemy could bring against them. The Merchant Navy was one of the main bulwarks of Britain's safety. The records of the convoys are full of stories of the dauntless heroism of the men who manned the ships

evolved ways and means of reducing—if not entirely eliminating—these perils.

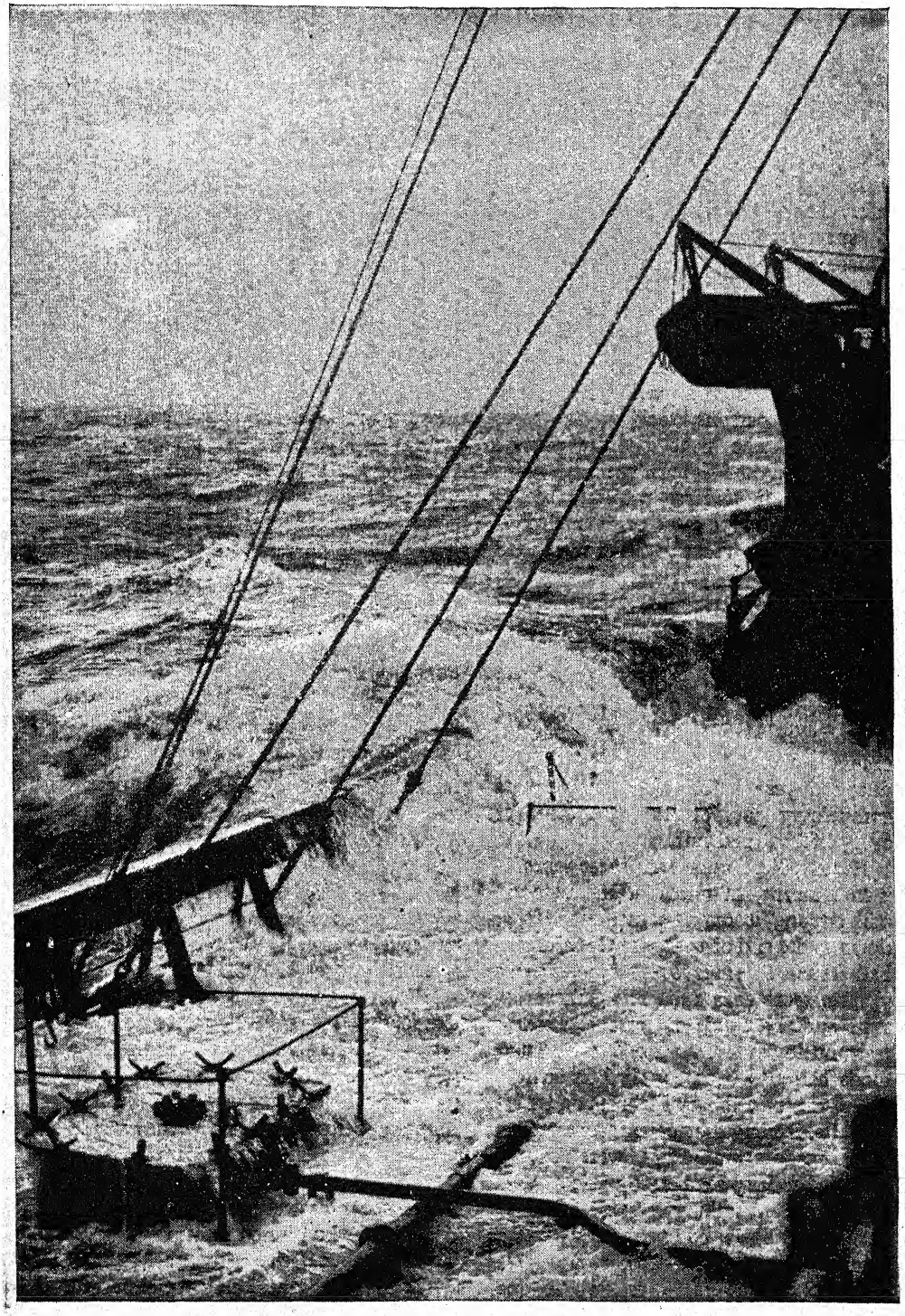
As tales of heroism and suffering reached the Ministry of War Transport, it was realized that everything humanly possible had to be done to succour the seamen in their distress. The Ministry became in no long time a scientific hot-house. Devices which were considered the last word in 1939 were progressively improved and a host of new ones produced. These measures were the means not only of saving thousands of lives, but also of avoiding much hardship and suffering. A new standard of safety was established.

As Lord Leathers pointed out in an article in *The Shipping World* of September 23, 1942, the most pressing need was to provide rafts which could be easily launched, and life jackets (described as waistcoats to distinguish them from pre-war types), which could be worn continuously while men were in dangerous waters. Improvements came later, until rafts were at last produced which afforded so high a degree of protection that, in one case, nine men survived the perils of a shark-infested sea until rescued in good condition, after thirty-four days, during which the raft had successfully ridden out heavy seas.

As a result of these measures the hardships of survivors in boats and on rafts were mitigated by the best equipment which science could devise, including weatherproof suits, manual pumps and massage oil, and by more varied and nutritious rations, with greatly increased



Grim skies and the grey seas of war threaten this oil tanker as she thrashes home with her precious cargo, her well-deck awash. On the horizon a watchful destroyer keeps guard



allowances of water. The means of calling help or attracting aid were multiplied and bettered. Rafts were automatically lighted up when they floated free of the ship. Life jackets and waistcoats were fitted with small electric lamps—the seamen's safety lamp—to guide the rescue boats to survivors. Special equipment was issued to protect the crews of tankers.

NEW SMOKE SIGNALS

When a passenger ship was torpedoed in the third year of the second World War, the crew and passengers, numbering 335 persons, took to the boats and rafts. The next day an aircraft was sighted and hopes ran high, but the plane disappeared without seeing them. Some hours later another aircraft was sighted and this time they succeeded in attracting the attention of the pilot, who dropped a message saying that he was sending help immediately. Surely enough, first a merchant vessel and then a warship appeared, and every one of those survivors was saved. The signal which proved so effective in attracting aid was the new orange-coloured smoke signal first introduced a year before, which became a compulsory part of the equipment of every lifeboat and raft.

As an indication of what these requirements meant, in terms of manufacture and supply, it may be mentioned that down to the end of 1942, the Government had issued to ships over 50,000 smoke signals, more than 150,000 weatherproof suits and thousands of portable wireless transmitting sets. Over 1,000 tons of new foods had also been supplied in airtight containers of 2 lb. for lifeboats and 1 lb. for rafts. Among the new measures which were made compulsory were several intended to help seamen to make a quick get-away from sinking vessels.

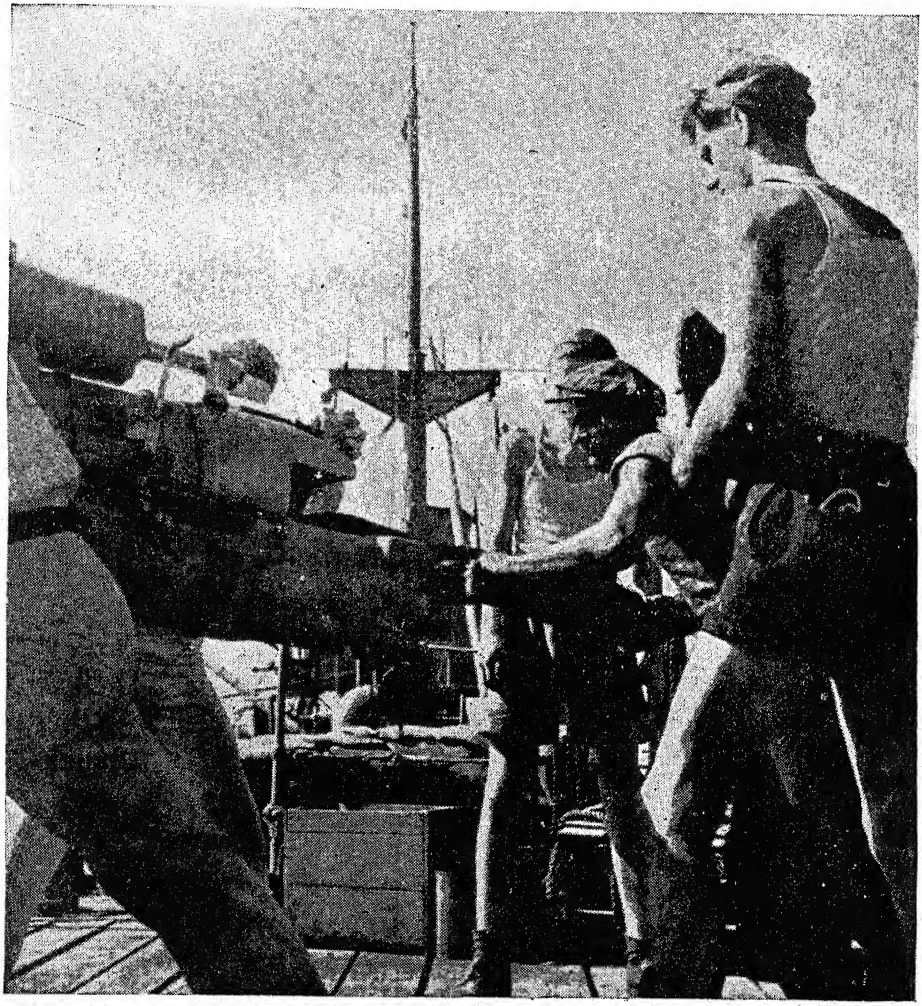
All who have co-operated with the Ministry in this work—owners and men, manufacturers of ship equipment and scientific and other experts—noted with pride that the recommendations made by the Joint Maritime Commission of the International Labour Office at their meeting in London in the summer of 1942 followed very closely the measures adopted in this country. When the war is over, we must not return to the old peacetime standards. Both sides of the industry are agreed, in principle, that wartime improvements must be preserved. It is sure that both sides will recognize equally the need for continuing efforts to mitigate the hardships and diminish the risks of the seaman's calling. In war or in peace, the aim must be to provide the maximum degree of safety. Nothing less will do.

The full story of the war at sea can never be properly told. If it could, it would fill many volumes and form a library of heroism the like of which has seldom been equalled. It would tell of British seamen—sleepless and haggard—striving to bring their sinking ships into port, of men in oil tankers, with thousands of tons of highly inflammable liquid under their feet, sailing calmly through a hail of bombs and shells. It would tell how sometimes these missiles found their mark and how the crew overcame the flames and brought their cargoes safely home.

RECORDS OF GALLANTRY

The records of the convoys to Malta and to Russia are full of stories of the heroism of British seamen who set sail time and time again—in the one case to take food and supplies to a besieged outpost of the Empire and in the other to carry war material to a gallant and hard-pressed ally. On every voyage they knew the perils before them, knew they would be lucky to get through unscathed.

Again, there is the story of the gallant men in the minesweepers—the fishermen of England who hunted far more dangerous prey. How, in their tiny trawlers, they swept the sea lanes along which our



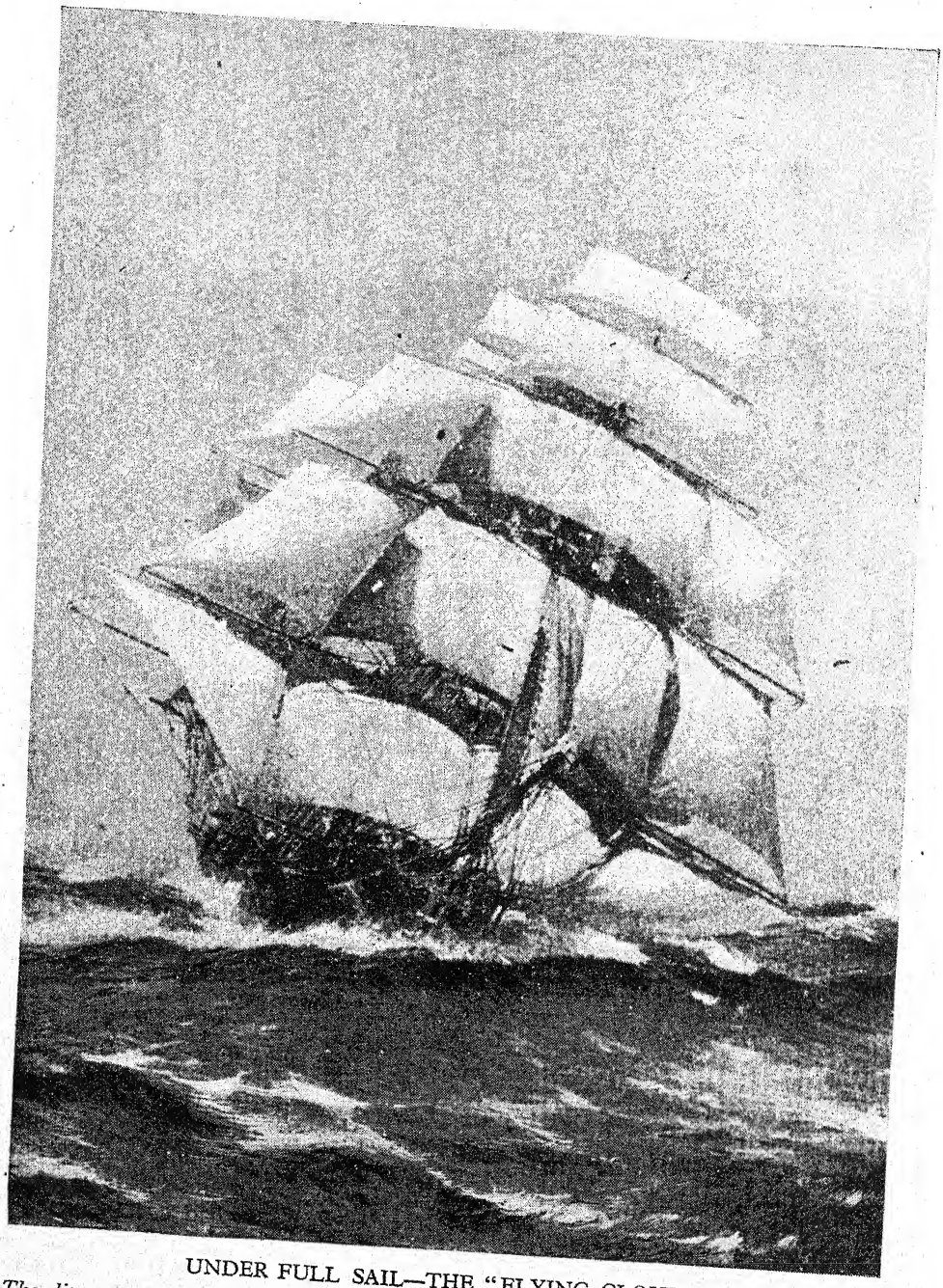
GUN PRACTICE ON A MERCHANT SHIP

To meet enemy attack became an essential addition to good seamanship, and the men of the Merchant Navy learnt to lay, load and fire the guns with which their vessels were fitted

supplies had to come. How they battled constantly with enemy aircraft and with fast, heavily armed E-boats, which sought to interfere with their work.

The bravery and endurance of the men of the Merchant Navy are beyond praise; our debt to them is beyond repayment. Their ships may be sunk under their feet; they may suffer desperate privation and misery in open boats before they reach land or are rescued; but no hardship deters them from setting forth in another ship as soon as opportunity occurs. Their steadfast courage stands star high.

After Napoleon had surrendered on board H.M.S. *Bellerophon* he said: "In all my plans I have been thwarted by the British fleet." There may well be a time when Hitler will say the same—and add "and by the British Merchant Navy."



UNDER FULL SAIL—THE "FLYING CLOUD"

The clippers were a royal race of sailing ships, "never excelled for beauty, grace, and speed." One of the most famous was the "Flying Cloud." The first clippers were built in America, but British shipbuilders produced rival ships, which made sailing history by their fast passages

CHAPTER 2

The Freedom of the Seas

Policy of the closed seas. Merchantmen in wartime. Protection of British shipping. Navigation laws and their repeal. Coming of the clipper ships. Sail versus steam. Iron ships. Increase of British and world shipping. First World War. Restrictions by foreign governments. Position of British shipping at start of second World War. Bravery of our seamen.

THE era of ocean trading—not only for Great Britain but for the world—opened when Queen Elizabeth threw down the gauntlet to the great sea powers of the period, Spain and Portugal. They claimed exclusive rights of navigation on the seas which their pioneer navigators had discovered. "The use of the sea and the air," Elizabeth declared to the Spanish Ambassador in London, who had protested against Drake's latest voyage into the prohibited waters, "is common to all, and no title to the ocean can belong to any nation since neither Nature nor regard for the public use permits any possession of the ocean." It was a proud statement.

THE CLOSED SEAS

It was one of the most courageous declarations in history. England—for Scotland was then a separate kingdom, and Ireland was in rebellion—had a population of only about five or six millions, and all the vessels engaged in ordinary commerce were estimated at little more than 50,000 tons burthen. Antwerp and Bruges, and not London, were the marts of the world, to which English merchants sent wool and drapery and other things that they had to sell. They used such little ships as they could secure, mostly under foreign flags, since there was little need for larger ships as long as the outer seas were closed to the traders of this country. Seamen of Spain had discovered the American continent and the Portuguese had made voyages round the Cape of Good Hope to India, for it was not until 1869 that the shorter route by the Suez Canal was opened to traffic. The success of these pioneers encouraged the rulers of their two countries to demand that no other seamen but Spaniards and Portuguese should enter the hitherto unknown oceans. The Pope, after studying the map of the New World, decided to give them his support. In effect, he divided the New World between these two countries.

For centuries past certain countries had claimed rights in specific seas, and restricted the movements of shipping and traders of other nations. The republics of Venice and Genoa had controlled all navigation in the Adriatic Sea and the Ligurian Sea respectively. Sweden and Denmark had claimed "absolute" command of the Baltic. Great Britain exercised a limited sovereignty over "the Narrow Seas," the North Sea, and the Atlantic from North Cape as far as Cape Finisterre.

MARITIME SOVEREIGNTY EXTENDED

When the great navigators broke into seas of which little or nothing had been known, this policy of "the closed seas" was extended and was generally recognized. Portugal claimed sovereignty over the whole of the Indian Ocean and of the Atlantic south of Morocco, and Spain over the Pacific and the Gulf of Mexico.

This policy was effective for many years. In 1478 Frederick III, Emperor of Germany, had to ask the permission of Venice for a cargo of corn to be carried for Apulia through the Adriatic Sea. As late as the seventeenth century England compelled foreigners to take out licences for fishing in the North Sea; when in 1636 the Dutch began fishing without such licence they were attacked and compelled to pay £30,000 as the price for the indulgence. Again, in 1554, when Philip II of Spain was on his way to marry Queen Mary, the English admiral who met him in the "British Seas" fired on his ship for flying the Spanish flag. The King of Denmark, returning from a visit to James I in 1606, was forced by a British captain, who met him off the mouth of the Thames, to strike the Danish flag.

HONOURING THE FLAG

Maritime sovereignty found expression, however, mainly in ceremonials, vessels being required to honour the flag of the foreign state concerned. Even as late as 1805, the year of Trafalgar, the Regulations of the British Admiralty contained an order that "when any of His Majesty's ships shall meet with the ships of any foreign Power within His Majesty's seas (which extend to Cape Finisterre), it is expected that the said foreign ships do strike their topsail and take in their flag, in acknowledgment of His Majesty's sovereignty in those seas; and, if any do resist, all flag officers and commanders are to use their utmost endeavours to compel them thereto, and not to suffer any dishonour to be done to His Majesty."

With her protest against the policy of Spain and Portugal in the New World, Queen Elizabeth opened up a new and brilliant chapter in the history of ocean navigation. She based her defiance on the ground that England had never pressed her claim so far as to attempt the prohibition of free navigation on the so-called British Seas, whereas Spain and Portugal had attempted to keep foreign ships altogether out of the seas over which they claimed sovereignty.

It was no little matter for the queen of a small and sparsely populated island with few ships of war or commerce, and with no colonies from which to draw wealth as Spain and Portugal drew wealth, to proclaim the new doctrine of the freedom of the seas.

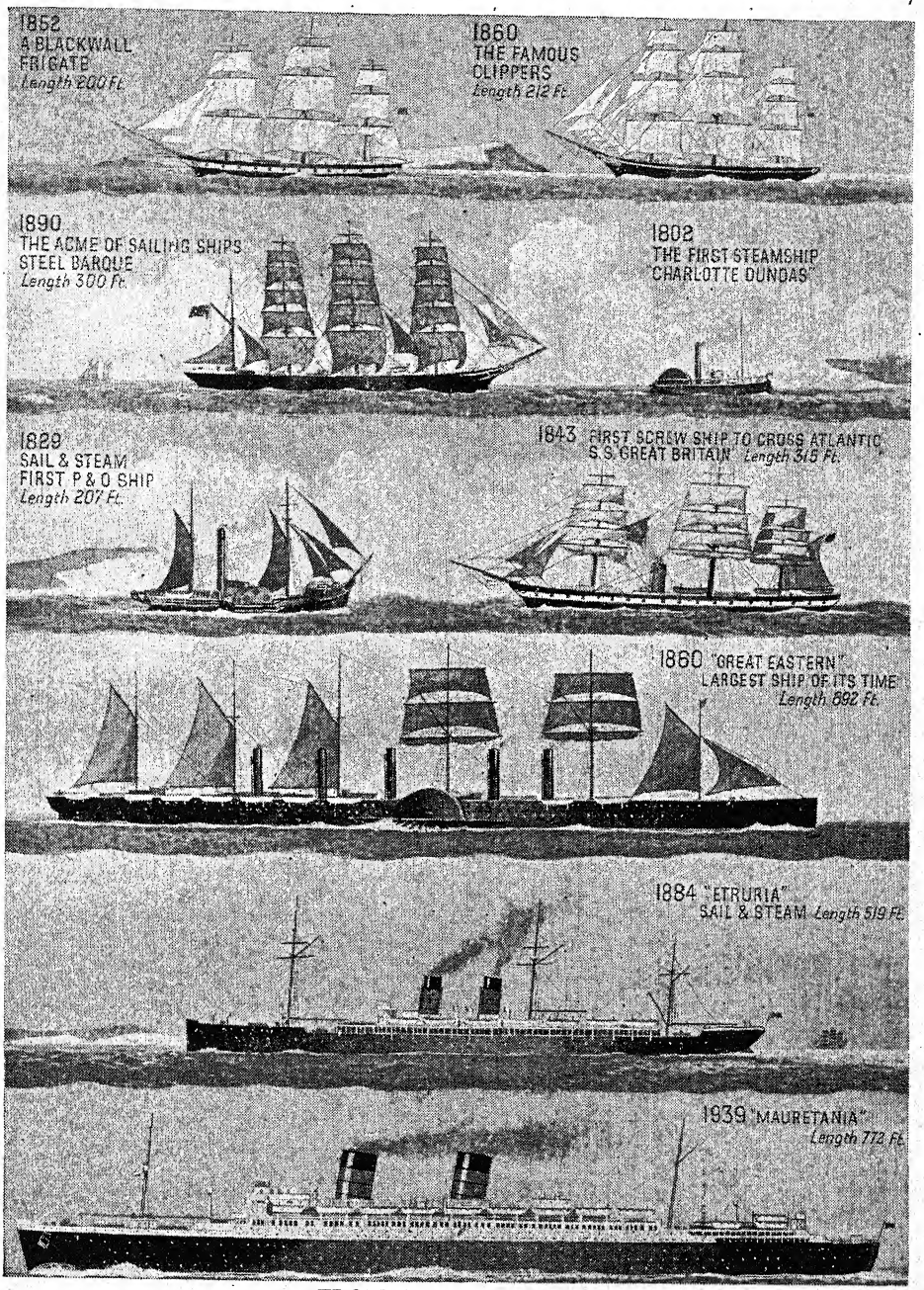
Her declaration may be regarded as the charter of ocean-going shipping. Thenceforward English seamen, at no little risk to themselves, sailed wherever they liked —Drake, Raleigh, Cavendish, Howard, Frobisher. The strength of the country at this time lay in its merchant ships and not in the Royal Navy, which was of little account. Queen Elizabeth had only twenty-six men-of-war with which to oppose the Spanish Armada, and the remainder of the 191 vessels were merchantmen from London, Bristol and other ports. When war broke out it was the custom for the sovereign to requisition whatever merchant ships were needed. Professor Sir Geoffrey Callender*, Honorary Secretary of the Society of Naval Research, has told us what happened on the outbreak of war when ships were required in emergency to co-operate with the Royal Navy.

NAVY ON HIRE

In the absence of roads in most districts, small vessels carried cargoes from port to port, other craft fished for herring and haddock round the coasts, bigger vessels went as far afield as Iceland after whale, and others ventured into the Mediterranean.

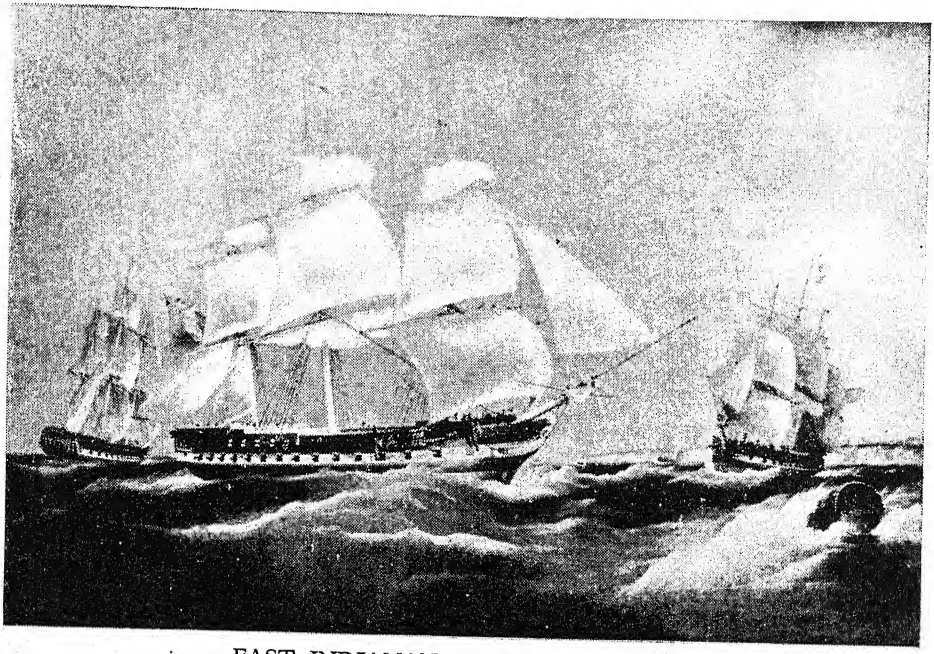
When war was imminent, all these ships were inspected. If suitable they were hired by the Sovereign and fitted for the carriage of soldiers; for it was as transports that they were usually needed. At either end of the ship, carpenters erected a tower

*The Naval Side of British History



FROM SAIL TO STEAM

The fascinating progress of merchant ships, over a period of a hundred and forty years, is vividly shown above. The first practical steamship, "Charlotte Dundas," serving as a tug on the Forth-Clyde canal, developed into the "Mauretania," the largest ship built in England



EAST INDIAMAN "HEREFORDSHIRE"

Fig. 1. *The East India Company (1600) built a fleet of armed merchantmen—a complete cargo-carrying navy. These fine ships had a monopoly of our trade with India and China. In 1803 the Company lent ships to the Government to guard against a French invasion (Crown copyright. By courtesy of the Director of the Science Museum, South Kensington)*

or turret—a structure something like the scaffolding which is used in building a house. Fir poles were set up and lashed together with ropes. Cross-bars gave additional support to the ship's stout deck, and stouter bulwarks gave a strong foundation. On the top of this cagework there was a floor of 3-inch plank, round which a crenellated breastwork for the protection of the fighting men was made. In time, the scaffolding was given an outer wall of pine planks or painted hides. These fighting stations were known as "castles," though they had none of the strength or permanence which the name implies.

In the forecastle of the converted merchantman, the soldiers were assembled. The man in the crow's nest would warn the captain if the enemy were sighted and the ship would be prepared for action with such weapons as were on board—bows and arrows, javelins, spears, quicklime and stones and even harpoons if the transport had been a whaler. Grappling irons were also carried; picked men gathered in the vessel's waist in readiness to carry the enemy by boarding as soon as she had been grappled and held.

After Queen Elizabeth made her proclamation of the freedom of the seas, the differences between ships of the Royal Navy and ships of commerce increased. As trade overseas grew it became necessary to build larger and more seaworthy ships which could load bigger cargoes. The invention of heavy cannons meant that room had to be found for ammunition which took up a lot of space at the expense of cargo. So the strength of the Royal Navy was increased, and the merchant ships' armament, for protection against enemies or pirates, lessened.

When the seas were thrown open to free navigation Drake sailed from Plymouth on November 15, 1577, for the circumnavigation of the world.

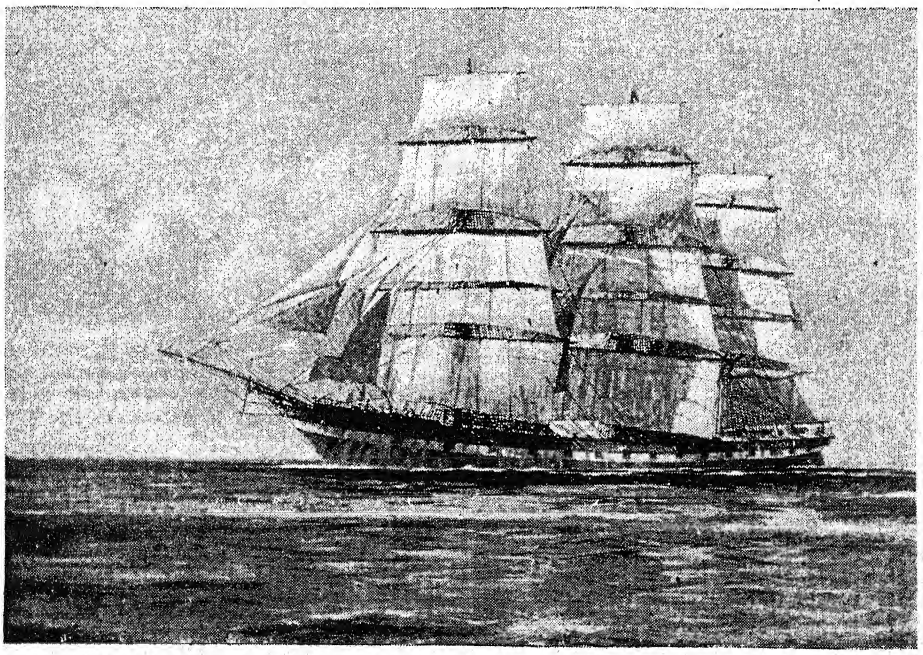
Five ships set out. The largest was the *Pelican* (afterwards rechristened the *Golden Hind*) which was of only 120 tons; the *Elizabeth* was of eighty tons. The sloops *Swan* and *Marigold* were of fifty and thirty tons respectively, and there was also a pinnace of twelve tons. What courage was exhibited by Drake and his companions in setting forth for seas into which neither they nor any of their fellow-countrymen had ventured before! The seas were as strong and fogs as dense as they are today when the Cunarder *Queen Elizabeth* of 85,000 tons is the pride of Britain's Merchant Navy.

As trade developed, many larger ships were needed. Our forefathers decided, in accordance with the economic theories then in fashion, that if shipping was to prosper, some form of protection should be given to the English merchantmen against competition, and Navigation Acts were passed. They were developed in later years until they confined British trade, in the main, to British ships. By the seventeenth century this legislation was regarded by British shipowners as their sheet anchor.

(1) Nothing could be imported into or exported from any English possession in Asia, Africa or America except in English ships.

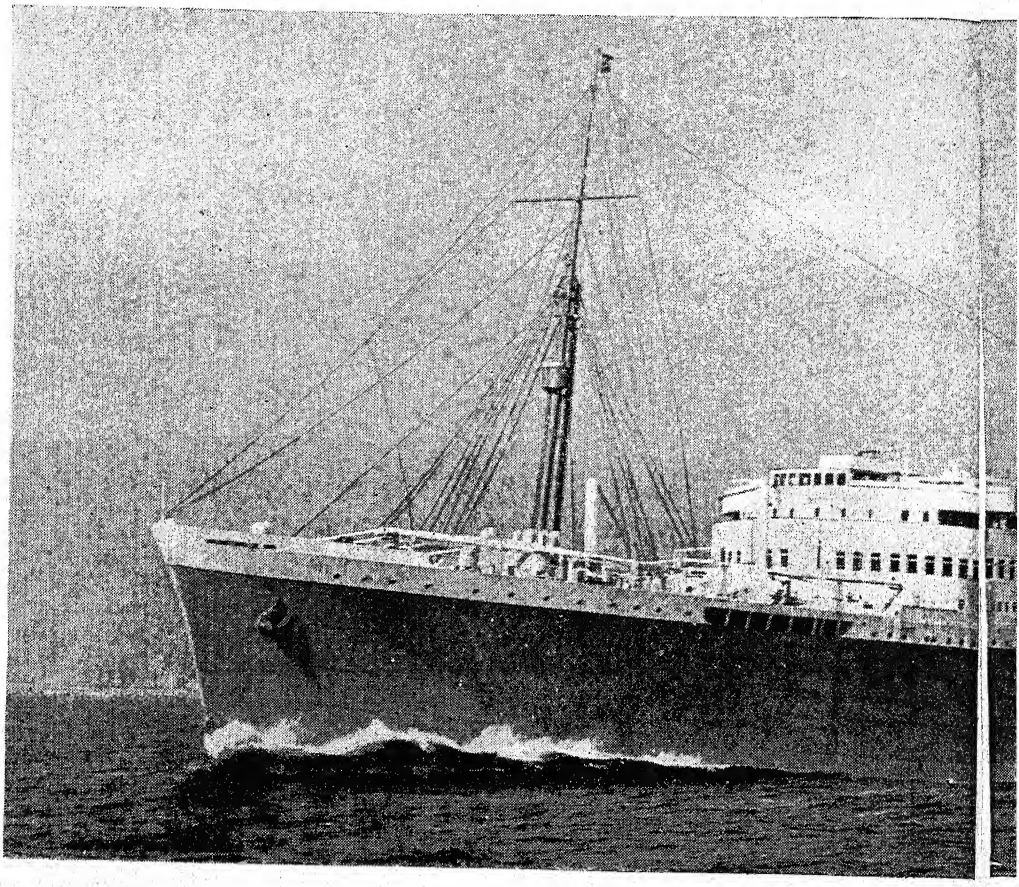
(2) English ships only could carry to this country any goods of native production or manufacture from Asia, Africa or America.

(3) Only English ships could engage in the coasting trade round Britain.



THE "CRUSADER"—A THOROUGHBRED OF THE OCEAN

Fig. 2. *The clipper ships were the dying effort of sail in its losing battle with steam. Built for speed, with tall masts and a magnificent spread of canvas, they were the most beautiful sailing ships ever known. Their captains, superb seamen, took all risks to make their record passages*



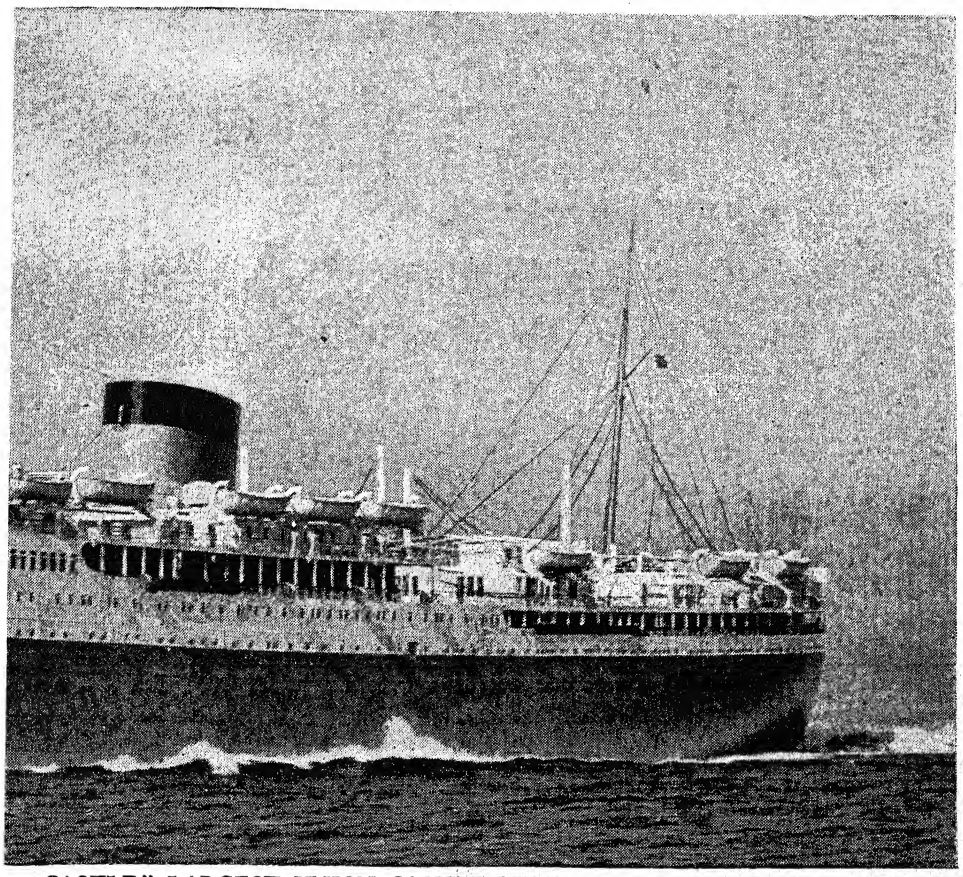
ROYAL MAIL MOTOR SHIP "CAPETOWN

In their time the royal beauty of the clipper sailing ships delighted every beholder, and pictures of them still give a thrill to us all. We get no less a thrill to see a great ship of today, such as the "Capetown Castle." Her beauty of line and grace of form are undeniable and the

The protection of the English shipping industry, which had been the object of legislation since the time of Richard II, was thus made complete: practically all competition was ruled out.

As a result of the new epoch in trading which began with the declaration of the freedom of the seas, English merchants, who frequently owned their own trading ships, sought charters for privileges in various parts of the world. One of these companies was known as the Merchant Venturers, another was the Muscovy Company, yet another the Turkey Company, and, in 1600, Queen Elizabeth granted a charter to the greatest and longest lived of these associations, the East India Company, which built, manned and armed its own fleet of ships—a complete cargo-carrying navy (Fig. 1).

The influence of these great companies on shipping may be judged from the wording of the grant to the Muscovy Company. "For the better maintenance of the Navy and mariners of this realm, be it provided and enacted that it shall not be lawful for the said fellowship and company to carry and transport or cause

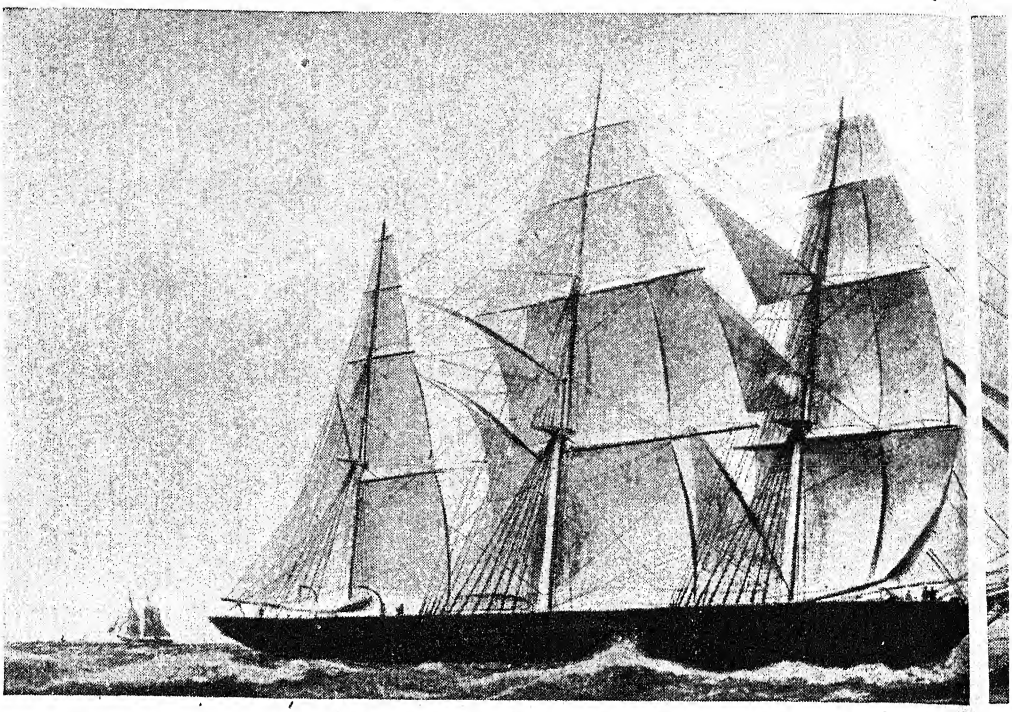


CASTLE" LARGEST UNION CASTLE LINER

picture conveys a striking impression of disciplined power and speed. Compare her with pictures of the early steamships on a previous page. A twin-screw motor vessel, she is the largest Union Castle liner, 27,000 tons. Built at Belfast in 1938, she carries 800 passengers

to be carried and transported any commodity of this realm to their new trade, but only in English ships and to be sailed for the most part with English mariners." The prosperity of the enterprising merchants was linked with the prosperity of British shipping. In later years the most successful competitors of this country on the high seas were the Dutch, and it was against them that the Navigation Laws in their final form were directed. Though the great economist, Adam Smith, was an out-and-out Free Trader, he commended such legislation on the ground that "defence was more important than opulence"; and he declared that this system was "perhaps the wisest of all the commercial regulations of England."

For long years, British shipping gained in strength and importance. But there came a time when the absence of competition sapped efficiency, and traders protested that the Navigation Laws were a serious handicap to them in developing overseas trade. At last the Government decided to investigate. In 1843 enquiries were sent to British consuls all over the world. Their reports showed that many



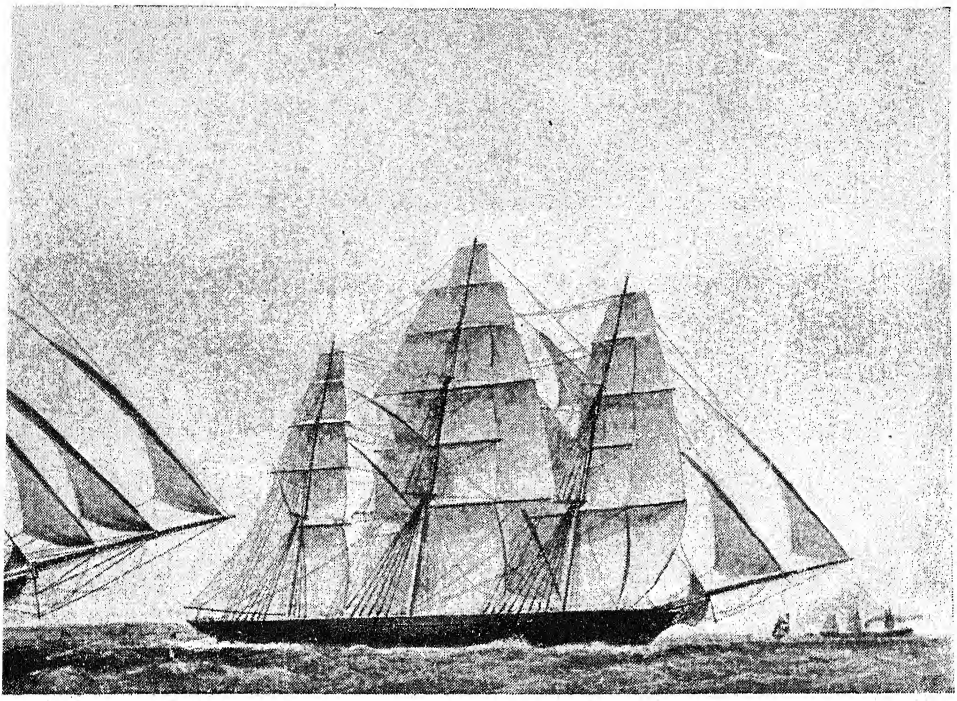
GREAT RACE BETWEEN "TAEPING" AND

Fig. 3. *Two of the most famous clippers were the "Taeping" and the "Ariel." The "Ariel" was the finest "ghoster" ever built—she could glide through the water with scarcely a breath of wind. These two ships ran a wonderful race from China. Starting at the same time, they*

ships were ill-found, that a number of officers and men were careless in their duties, and that drunkenness was responsible for the loss of many vessels. Exposure of the abuses which the restrictive policy had encouraged led to an agitation for the repeal of the Navigation Laws. Step by step the various prohibitions which applied to foreign ships were swept away, and in 1854 even the coasting trade was thrown open to foreign ships.

Queen Elizabeth had made the seas of the world free to all nations. By the repeal of the Navigation Laws and the cancellation of the charters to the trading companies, the carrying trade of the whole British Empire was thrown open to all comers. Shippers of goods could employ ships under any flag. It was natural that shipowners should fight against this change in policy, protesting that it would ruin them, but British shipping took a fresh lease of life. Whether this was due to the spur of foreign competition, to the industrial progress of this country, which was becoming "the workshop of the world," or to the skill of British shipbuilders in producing finer ships of iron instead of wood than were to be found under foreign flags is a matter of controversy. But it is certain that the tonnage under the British flag steadily increased in the following half-century. Also, under the influence of competition, the status of the industry was gradually raised.

By the beginning of the nineteenth century the number of British merchantmen exceeded 20,000, making more than 2,000,000 tons in all. In due course, bigger and more seaworthy ships were designed,



"ARIEL"—CHAMPIONS AMONG THE CLIPPER SHIPS

docked in London within a few hours of each other, after ninety-nine days at sea! The race was made a dead heat. Once the "Ariel" made a record London-Hong Kong passage, 79 days, 21 hrs. (By courtesy of the Controller of H.M. Stationery Office. "Sailing Ships," Part I)

to carry larger cargoes at cheaper rates.

An impetus to the development of British shipping was given by the keen competition of American shipbuilders. They turned out clippers which were for a time so superior in speed, as well as in sea qualities, to contemporary vessels built in this country that many owners ordered new ships from American yards or chartered American vessels for their trade. The clipper ship was an American development, and the rivalry between the American and British ships of this type makes one of the most exciting chapters in the commercial history of the two countries.

The clipper ship (Fig. 2) was the dying effort of the sailing ship to compete with the steam ship. The clipper ship had bows that cut the waves so as to set up less skin friction than the vessels which had hitherto been built, gaining much in speed. Marine architects in America defied convention by modifying the design of the stern in such a way that, instead of squatting and holding the dead water, the ship slid through it cleanly with a minimum of resistance. The one object of the American designer was to build a ship that should outsail every other craft and so obtain the maximum of cargo carrying. Besides the improvement in bow and stern, the Americans lengthened the ship until she became five or six times longer than her breadth, against four times the beam in the case of the East India Company's ships.

This enabled them to add a fourth mast to the ship and to carry more sails. The sails themselves were improved in cut. In contradistinction to the East Indiamen, these American ships did not reef down

in anticipation of the gale that was to follow hours afterwards, but took in sail with the greatest reluctance.

The part played by the American clippers between the close of the Napoleonic Wars and the beginning of the American Civil War is one of vast importance in the development of the sailing ship. Even when steamers began to cross the Atlantic in 1840, these wonderful racing clippers were able to sail across the ocean in about a fortnight.

TWO FAMOUS CLIPPERS

British shipowners were not slow to learn their lesson in ship design from the Americans, and a keen sporting competition occurred between the clippers of the two countries. It was especially marked in the China tea trade, and also during the Gold Rush to Australia from 1851 onwards.

The great race home of the *Ariel* and the *Taeping* (Fig. 3) marks an unforgettable epic of clipper-ship rivalry. These two ships left Foochow in China on the same day, London bound. The date was May 30, 1866. There was bad weather, with squalls and driving mist, but the captains clapped on sail.

Twenty-one days out, the *Ariel* and the *Taeping* passed Anjer Point, and both ships made this landmark on the same day. Off the Cape of Good Hope the *Taeping* and the *Ariel* were close together. On August 12, when the ships had been over seventy days at sea, the *Ariel* made the Cape Verde Islands. She led the race for the first time—but the *Taeping* was only a day behind.

Ninety-eight days out, on September 5, the *Ariel* sighted the Bishop Rock Light in the Scilly Isles. The *Taeping* showed swiftly with the same day's dawn, and the two great ships swept together up the Channel. In the end, the *Ariel* and the *Taeping* docked in London within an hour or so of each other. The race was declared a dead heat and the captains shared the prize of £100 and the premium of ten shillings a ton for the first cargo home.

The speed which a crack clipper ship attained under favourable wind conditions put her far in advance of the economic rate of an ordinary cargo carrier of today.

The passage from Hong Kong to London was made in 1850 by the American clipper *Oriental* in ninety-seven days. The British ship *Lightning* reached Liverpool from Melbourne in sixty-three days. On one voyage the latter ship exceeded for a period of a week a speed of 15½ knots, whereas the tramp ship of today makes only 10 to 11 knots. But whereas the sailer might be becalmed for many days on end, the steamer was to a great extent independent of weather conditions.

The sailing ship made a gallant fight, but its fate was sealed as the marine steam engine was improved and became more reliable for long distance voyages. But as late as 1892 there was built on the Clyde the *Marie Rickmere* with a sail area of no less than 56,500 square feet, over four miles of steel wire for shrouds, stays, and so on, and not far short of six miles of running cordage. She was a ship of wonder! But though such ships were still being launched in this and other countries, the issue of the battle between sail and steam was never in doubt.

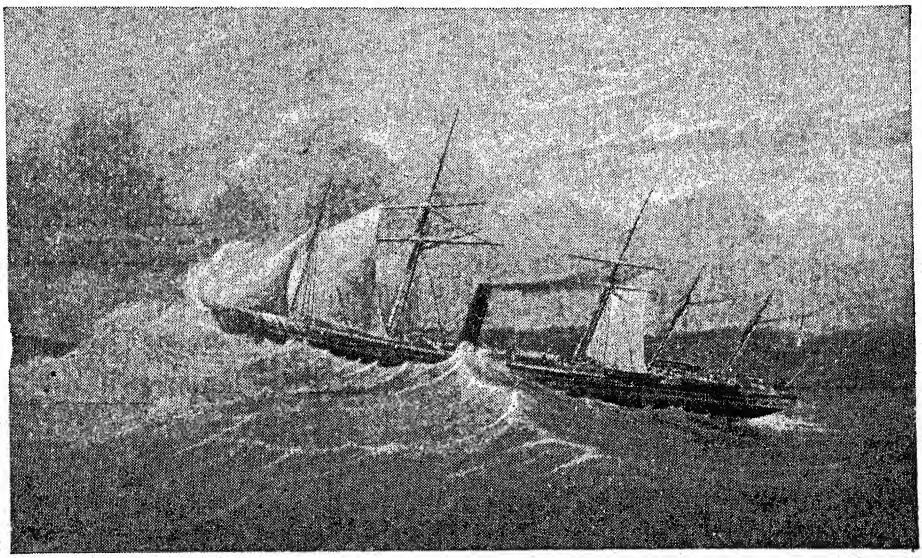
STEAM CONQUERS SAIL

As time went on, the steamship drove the sailing ship off the sea. Now the sailing ship does not count for anything in international trade—a gain in efficient transport, but an æsthetic loss, for the sailing vessel was a thing of great beauty.

The Americans had shown that they could build the finest and swiftest clipper ships. In 1814 they launched their first steamship on the great waters of the Mississippi, and immediately proceeded to develop their internal maritime communications. Such was the spirit of

enterprise of the Americans that by the early sixties the British lead amounted to little more than a quarter of a million tons. Then came the Civil War. The North possessed only a small fighting fleet, and, in the emergency, the authorities turned to the mercantile marine in order that economic pressure, by means of a blockade of the numerous ports of the Confederacy, might be applied without delay. Warships were improvised, but at a terrible cost to the Merchant Marine. As time went by, the decline not only of American, but of other foreign fleets, reflected the skill and enterprise of British shipowners who realized that the ball was at their feet and took full advantage of it.

In an official report published in 1875, the Secretary of the Board of Trade, writing from his office in London, stated that whilst the British tonnage in the trade of the United Kingdom had increased from sixty-five per cent of that trade in 1850, to sixty-eight per cent in 1870,



TRANSATLANTIC PIONEER

Fig. 4. *The first large Transatlantic iron steamer was the "Great Britain," the first ship fitted with a screw propeller to cross the Atlantic. Her departure from Bristol, where she was built in 1843, had to be postponed for a year as she was too wide to pass through the dock gates. She convinced even the doubters of the strength and practicability of iron ships (Crown copyright. By courtesy of the Director of the Science Museum, South Kensington)*

A number of ships under foreign flags took the place of the American vessels on some of the principal trade routes.

The recovery of American shipping was retarded by the discovery that ships could be built of iron, which many people had disputed, instead of wood. British shipyards, with plenty of iron ore near at hand, began building ships of iron propelled by the marine steam engine (Fig.4). United States tonnage, which had sixty per cent of the trade to the United States in 1850, had only thirty-eight per cent of it in 1870. French tonnage, which had forty-one per cent of the trade of France in 1850, had only thirty-one per cent in 1870. Dutch tonnage, with forty-two per cent of the trade of Holland in 1850, had only twenty-eight per cent in 1870. Prussian tonnage, which had forty-nine per

cent of the trade of Prussia in 1850, had forty-six per cent in 1870. Swedish tonnage fell from forty-three per cent in 1850 to thirty-two per cent in 1870. Although the marine trade of Norway had rapidly grown, her tonnage, which had seventy-three per cent of her trade in 1850, decreased to seventy per cent in 1870.

In these years, British merchant shipping underwent a revolution, partly owing to the increased interest which Parliament took in its welfare by insisting on better seaworthiness and partly owing to the action of leading shipowners in setting their own house in order.

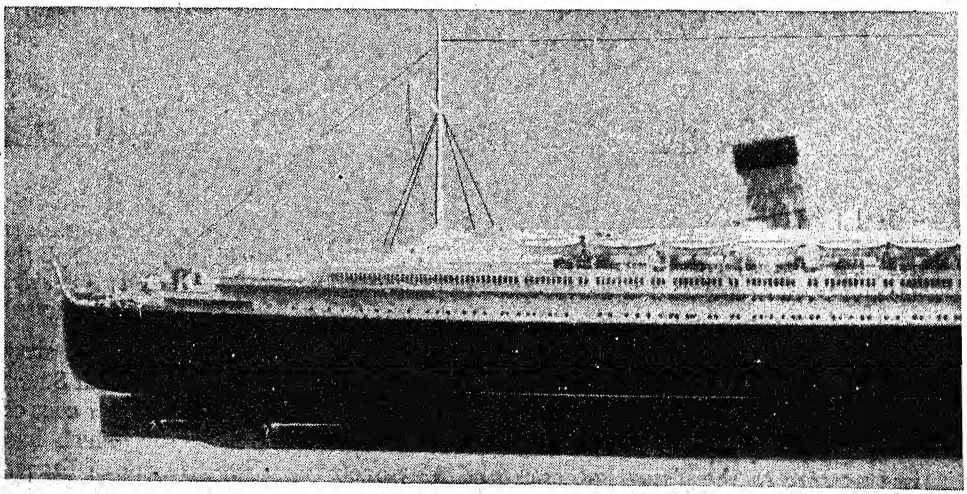
BRITAIN'S SHIPS LEAD WORLD

Lloyd's Register made rules for design and construction in advance of those prescribed from Whitehall; underwriters helped this movement to improve the character of merchant ships of all classes by issuing a certificate only to those vessels which conformed to the rules of the Register. Plimsoll's agitation in the seventies, which ensured a mark being placed on every vessel to check overloading was another most valuable contribution towards the greater safety at sea of passengers, crews and goods.

Under these conditions, British owners took a great pride in their ships, and officers and men at sea acquired high qualifications. The industry forged ahead, and the shipbuilding industry shared its prosperity.

A few figures will show the progress made in the years preceding the war of 1914-18. As late as 1884 eight out of every ten merchant ships under all flags, as well as many foreign men-of-war, were of British construction; even in 1914 the percentage of merchant ships of the world built in this country was as high as 61·9.

"There are few important industries," a Departmental Committee reported in 1918 "where the predominance of British manufacturers has been more marked than in shipbuilding and marine engineering." The report stated that compared with twenty years previously, the output from British shipyards and marine engine works



ONE HUNDRED YEARS OF PROGRESS

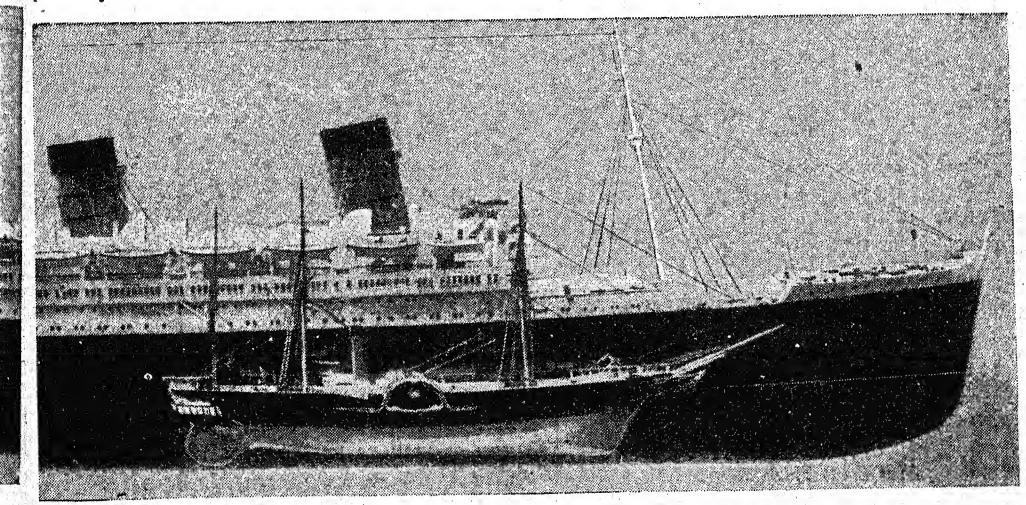
The tiny "Britannia," a pioneer of the Atlantic crossing, and the mighty "Queen Mary" are here compared. In 1840, the "Britannia," driven by paddle-wheel engines, took fourteen days to cross. In 1936, the "Queen Mary," five times as long as the "Britannia," made the 3,000-mile passage from Southampton to New York in four days, five hours,

had shown a decline in the proportion which it bore to the world's output; but it added that "the normal production of British shipyards was, before the war, still greater than that of all foreign shipyards put together." As to shipping, in 1890 the gross tonnage owned by Great Britain and Ireland amounted to 10,439,000 tons; this gradually increased until in 1914 it had reached a total of 19,256,000 tons, representing an increase of eighty-five per cent. But during the same period, the tonnage of the rest of the world rose from 11,410,000 tons to 30,098,000 tons, representing an increase of 164 per cent.

Then (1914-18) came the U-boat campaign of the Germans. Seven million tons of British shipping were sunk and the lives of 13,000 seamen were sacrificed. Could the industry recover from such blows? Many observers in foreign countries were satisfied that here was the opportunity to undermine the maritime industries of the British Isles. New shipyards were laid out and subsidies were paid to enable the newly built vessels to compete successfully with British shipping on the great trade routes of the world. At the same time foreign governments continued to reserve all coastal shipping to vessels under their national flags, while British ports remained open on terms of equality to ships of all nations in accordance with the principles of Free Trade which were then officially held.

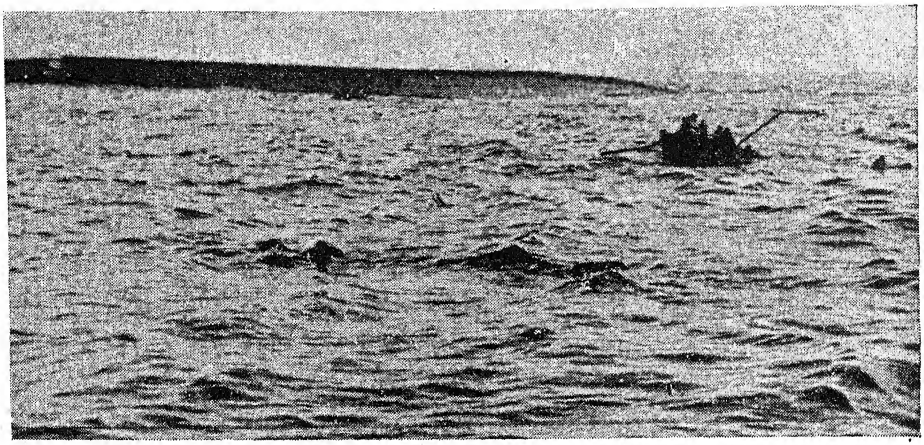
CAUSES OF DECLINE

What happened? Without State aid British shipowners could not fight successfully against foreign shipyards and foreign shipowners, spoon-fed by their national treasuries. The course of events can best be indicated by a few figures. In 1919, the tonnage owned in Great Britain and Ireland amounted to 16,555,000 tons and after increasing to 20,438,000 tons in 1930, it had fallen to 17,984,000 tons in 1938. During the same period, the tonnage of the rest of the world had grown from 34,331,000 tons in 1919, to 50,063,000 tons in 1932, and then, after a fall,



IN TRANSATLANTIC TRAVEL

forty-six minutes, although she was delayed by fog. She made a run of 766 miles in a single day, at an average speed of thirty knots. The "Britannia," built of wood, was 1,150 tons, 740 horse power—speed only nine knots. The "Queen Mary" is 60,744 tons, 200,000 horse power. (Crown copyright. By courtesy of the Director of the Science Museum, S. Kensington)



SURVIVORS RESCUED AS SHIP GOES DOWN

A collier sinks after striking a mine. The keel of the sinking vessel can be seen in the background. Victims are swimming in the ocean, and survivors are being helped aboard one of the ship's lifeboats, which is rowing towards the rescue ship. Three of the crew were lost. The collier was in convoy and the photograph was taken from one of the convoy's escort ships

had risen to 51,455,000 tons in 1939.

When the war began in September, 1939, there was not sufficient tonnage under the British flag. If it had not been for the ships of Norway, France, Greece, Denmark, Belgium and Holland which eluded the Germans and sheltered in our ports—amounting to about 8,000,000 tons—the country would have been hard pressed to survive; and that is to put the matter in its most moderate terms. Those ships bridged the interval between the opening of the struggle and the launching of great numbers of vessels from the shipyards of the British Isles, the United States, Canada and Australia. It was not long before our position was considerably improved through the unremitting efforts of Empire and United States shipbuilders, who did everything possible.

SERIOUS HANDICAPS

The British people, dependent for most of their raw materials as well as half their food on overseas supplies, entered the war which was forced upon them in the autumn of 1939, under a serious handicap. As compared with 1914, there was a shortage of 2,000,000 tons of sea-going ships, and the number of seamen had also declined. The enemy had U-boats with a greater radius of action than in the former struggle, and much improved mines. A menacing new danger was the bomber.

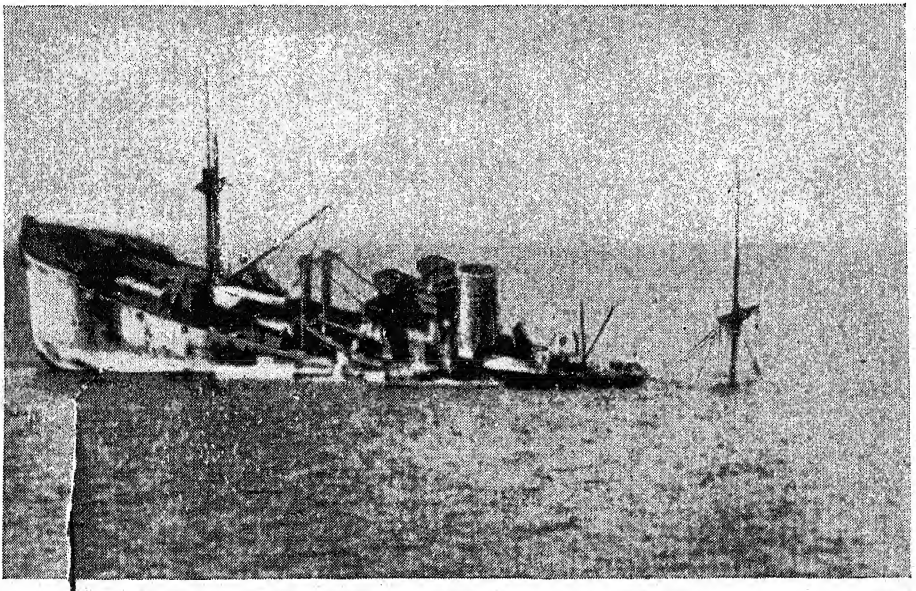
BRITAIN'S PERIL

The courage, skill and resourcefulness of British seamen saved a situation which was full of peril for the 48,000,000 men, women and children of the British Isles. The Germans, with the support of the Italians, had the odds heavily in their favour, and these were further increased when they overran the Low Countries and Northern France and thus obtained convenient bases for their piratical operations, which extended far out on the Atlantic Ocean as well as to the Mediterranean. The position worsened when Japan in the autumn of 1941, with a perfidy even exceeding that of her Axis partners, entered the war, for she possessed not only a large navy but a merchant fleet nearly twice as large as that which had existed in 1914.

Future generations will acclaim as without parallel in history the valiant spirit in which British merchant seamen, in their frail ships, fought for the freedom of the seas against the twentieth-century pirates armed with the gun, the torpedo, the bomb and the mine. They carried on in face of Nature's handicaps, storms and fog, and the carefully planned attack of three powerful enemies. Many thousands of them paid the forfeit of their lives in order that the world's seas might remain open for the freedom-loving nations. Thousands of others, after surviving the hardships inevitable in open boats, reached shore only to demand that they should be allowed to go to sea again—such was their courage. In the records of the sea, there is nothing comparable to the manner in which these seamen, as well, let it be added, as those of Norway, Holland, Belgium, Greece and the other Allies, opposed their weakness, as civilians untrained in the acts of war, to the long-planned campaign of the Axis Powers. Our enemies had all the advantages in their favour except one. This was the spirit of the brotherhood of the sea which, in past centuries, led to the suppression of piracy and slave trading, and to the charting of the oceans so that men of all races might go down to the sea in ships and do their business in the great waters.

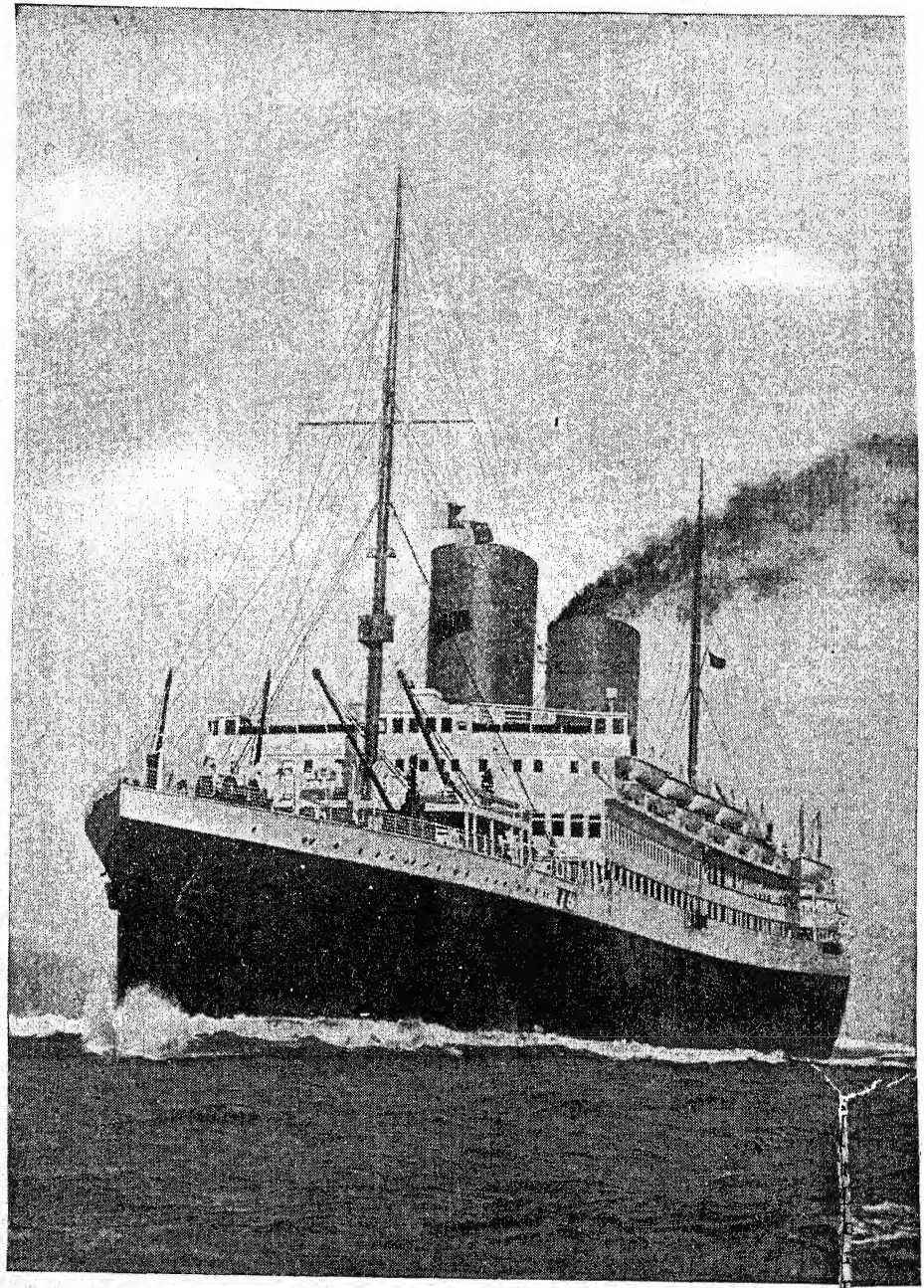
EPIC BRAVERY

Historians have praised the daring, courage and resourcefulness of the Elizabethan sailors after the Virgin Queen had declared the seas of the world open to the seamen of all the maritime nations. But nothing has happened in the past 1,000 years which compares with the dauntless courage, endurance and skill of our merchant seamen, who stood up, without flinching or complaining, to the onslaught of the pirates of the twentieth century.



ANOTHER ATLANTIC VICTIM

Slowly sinking after being torpedoed by a U-boat, this ship is about to make her death plunge into the Atlantic. The picture was taken from a plane which signalled the position of lifeboats containing survivors. Patrol planes have saved many lives in the Battle of the Seas



PASSENGER AND MAIL LINER "ALCANTARA"

Passenger liners with large cargo accommodation have always been highly important ships in the Merchant Navy. The "Alcantara," of over 17,000 tons gross, was built for trade to the River Plate from Southampton, and is a most efficient unit of Merchant Navy power

CHAPTER 3

Ships of the Merchant Navy

Britain's lead in merchant tonnage. Tonnage terms. The passenger liner. Cross-Channel ships. Cargo liners. Advantages of oil fuel. Empire food ships. Fruit and meat carriers. Tramps. Flush-deckers and three-island tramps. Ore carriers. Oil tankers. Whale-oil factories. Coasters and colliers. Paddlers. Trawlers and drifters. Tugs. Dredgers and hoppers. Salvage ships. Cable-layers. Ferries and train carriers.

PICTURES of convoys of merchant ships with their precious cargoes of food, raw materials and munitions, will in after years be among the most important documentary evidence of the vital part played by Britain's Merchant Navy in the second World War, and of the purposes for which different kinds of ships were employed. A big war convoy may include practically every type of ship; cheek by jowl with a large oil-carrying vessel will be a small ship designed for trading to the Baltic; alongside a ship well known in the South American trade. That is one of the reasons why a study of ship types is so important, and fascinating.

WARTIME DISGUISES

If there were convoys in peace time, it would still be hard for the lover of ships to identify the different types which the convoy had gathered together.

In wartime, the snowy white decks, the glistening upper works, gaily coloured funnels, slim hulls outlined in mauve or white or black—all the usual aids to recognition—have utterly vanished. Everything presents a drab and sinister sameness; yet all the types of peace time are there, but disguised.

The British Mercantile Marine has more ships than any other country. At the outbreak of war in the autumn of 1939 they totalled nearly 19,000,000 gross tons, and there were not far short of 9,000 individual ships, or bottoms, as they are often called. In addition there were over 3,000,000 tons of shipping owned in the British Dominions and Colonies. These amounted to well over 2,000 ships.

So the British Empire started the war in 1939 with more than 11,000 individual ships, having a total tonnage of over 21,000,000 gross—most of them in peril from enemy action. The problem of the shipbuilder was to maintain that number, in spite of losses due to gun, torpedo, bomb and mine and marine casualties from weather or other causes. It was a problem somewhat akin to trying to keep full of water a bucket with a hole in its bottom. The size of the hole depends upon the success of the enemy's attack and upon the effect of the offensive and defensive measures taken by the naval authorities to counteract them.

ALL THE WORLD'S SHIPPING

Grim though the picture has been from time to time as the war went on, we may thank the sturdy sea spirit of our seamen, and the individualism of the owners, for having kept the Mercantile Marine so strong and efficient in time of peace, beset as they were for many years by economic difficulties and international storms.

Great Britain, in association with her Allies, and later the United States, was

probably in a better position to face total sea war than any other nation. This is clear from a brief survey of the leading mercantile marines of the world (Fig. 1).

At the beginning of the war the United States held second place as a commercial sea power, even if the large number of ships which traded on the Great Lakes were excluded. Her sea-going tonnage amounted to more than 9,000,000 gross tons. The Lakes contributed nearly 2,500,000 tons.

Japan came third, with over 4,000,000 gross tons, followed by Norway, much of whose 4,000,000 tons worked for the Allied cause from the time when she was overrun by the Germans.

POSITION OF GERMANY

Germany was fifth on the list with less than 4,000,000 gross tons and then came Italy, with 3,050,000 gross tons. A fine group of fast ships had been built by Italy in the years preceding the war.

France—with nearly 3,000,000 gross tons—owned excellent merchant ships and was seventh, while friendly Holland stood eighth in order of precedence. Greece, one of the biggest tramp ship owning countries in the world, possessed nearly 2,000,000 gross tons. At the tail of the list came Sweden, with just over 1,500,000 gross tons, Russia, Spain and Denmark.

Russia's contribution to the merchant sea power of the world was nearly 1,200,000 tons.

Lloyd's Register gives its figures in tons gross. What is the meaning of the various tonnage terms which are in use? Tonnage measurement is an old art, complicated in conception and, like many old things, somewhat unfitted to modern conditions. It goes back to the days when tons were tuns—i.e., tuns (or casks) of wine.

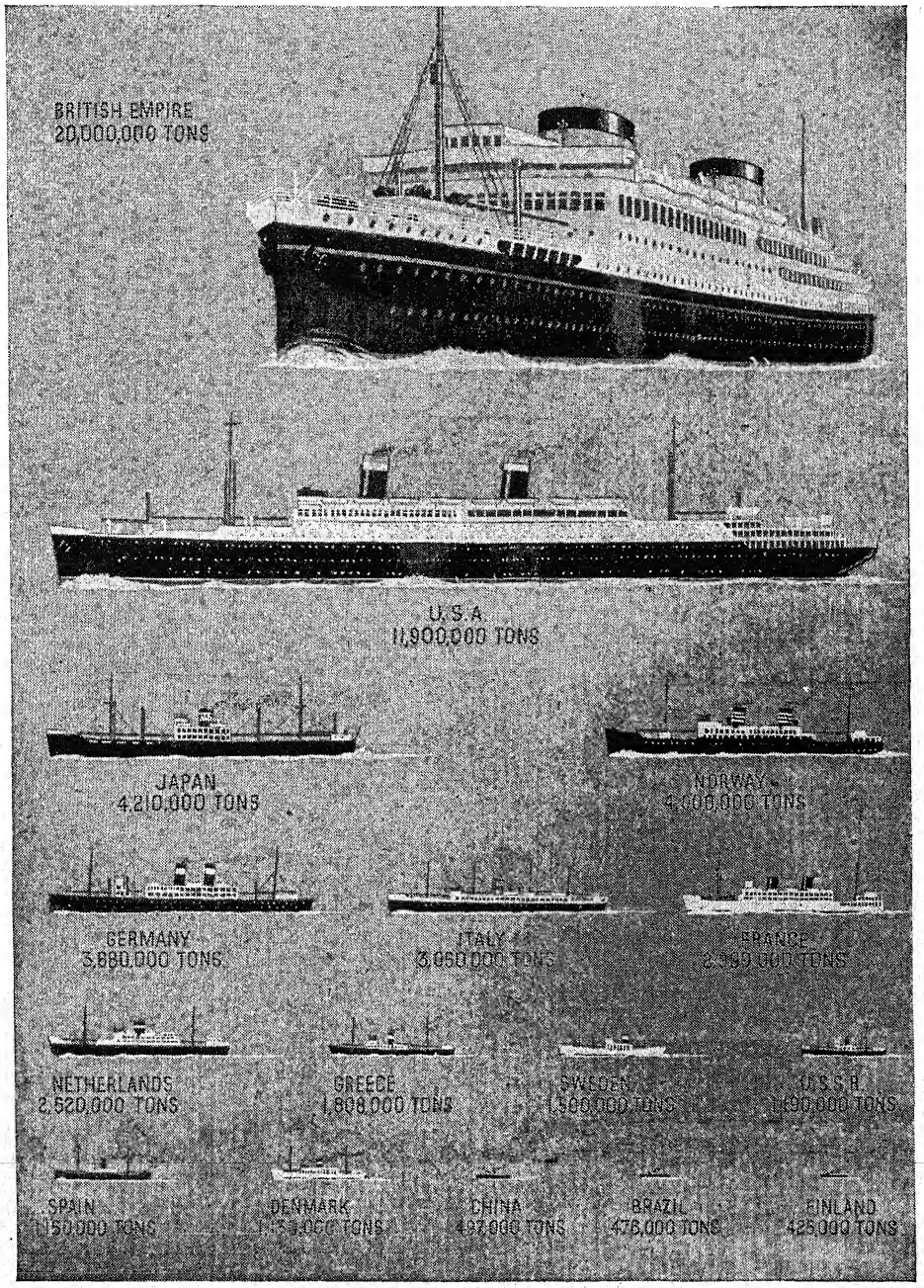
Gross tonnage is a measure of the ship's internal capacity, expressed in tons of 100 cubic feet. Gross tonnage is usually employed when referring to ships like passenger liners, or cross-Channel ships, to paddle vessels, cable-layers, or ships which are not specifically designed for the carrying of cargo in quantity or bulk. On the other hand, ships which carry masses of cargo—what is called bulk cargo—such as tramps, tankers, coasters, ore carriers and so on, are usually referred to in tons of 2,240 lb., the deadweight capacity of a ship being the amount of tons of material which she can carry. Some of the biggest oil tankers are capable of carrying up to 15,000 tons, whilst an ordinary tramp may carry between 9,000 and 10,000 tons. Conversely, and perversely, it is sometimes possible to think of these capacities in terms of cubic feet—not to be confused with the cubic feet (100 per ton) by which gross tonnage is measured.

Then there are other kinds of tonnage, such as net tonnage, upon which light dues are based; displacement tonnage, which is the actual weight of a ship in the water. To avoid confusion, however, it is well for our present purpose to use the terms gross tons and tons of deadweight capacity, for by so doing the discussion of various ship types will be much easier to understand.

GROWING NUMBER OF TYPES

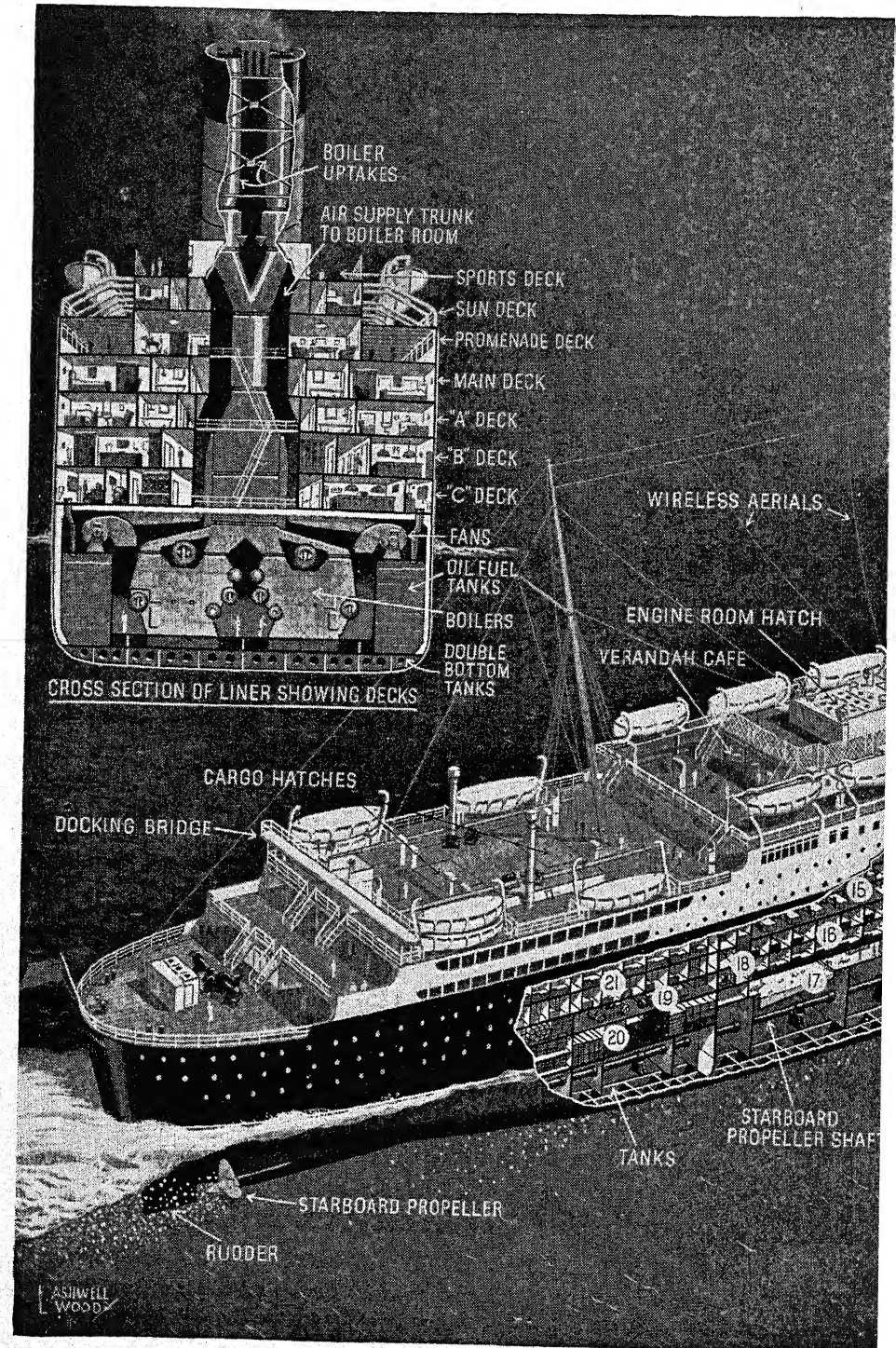
There is another dimension to be considered; that is draught—the amount of water a ship draws or the amount under her keel. A cargo ship is designed with a certain maximum or greatest draught: she floats at this only when fully loaded. When half loaded or with little or no cargo she is at light draught. It is interesting to note that the difference may be as much as twenty feet in a big ship.

The number of merchant ship types has grown appreciably in recent years; indeed trading fleets have been growing in complexity for the last fifty years or so. In Napoleon's day, the relatively few types



PRINCIPAL MARITIME POWERS AT OUTBREAK OF WAR

Fig. 1. *This diagram-survey clearly shows the British Empire's position in commercial sea power—with 20,000,000 tons of merchant shipping—at the beginning of the second World War*


BOILER UPTAKES
AIR SUPPLY TRUNK TO BOILER ROOM
SPORTS DECK
SUN DECK
PROMENADE DECK
MAIN DECK
"A" DECK
"B" DECK
"C" DECK
FANS
OIL FUEL TANKS
BOILERS
DOUBLE BOTTOM TANKS
CROSS SECTION OF LINER SHOWING DECKS
WIRELESS AERIALS
ENGINE ROOM HATCH
VERANDAH CAFE
CARGO HATCHES
DOCKING BRIDGE
15
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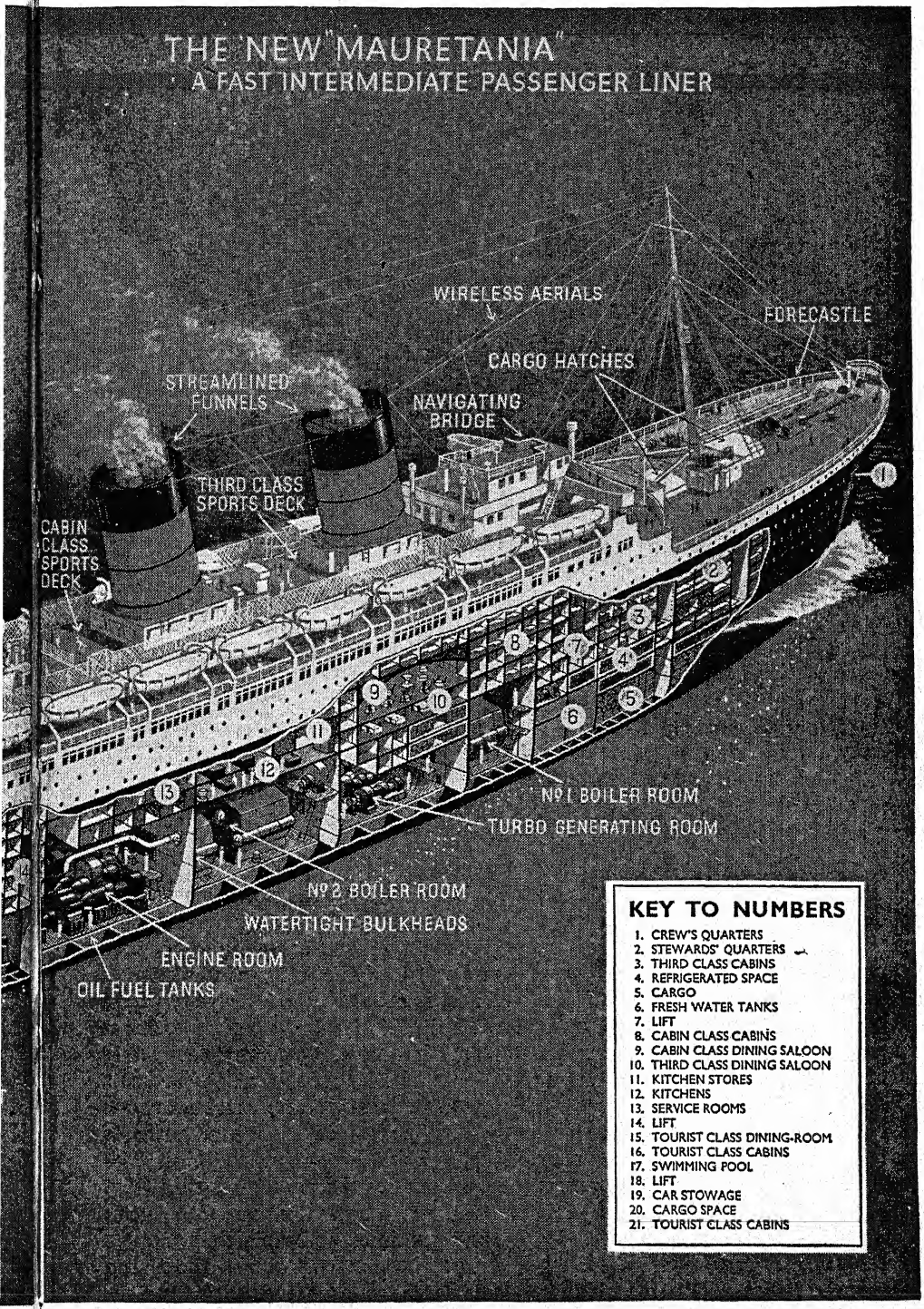
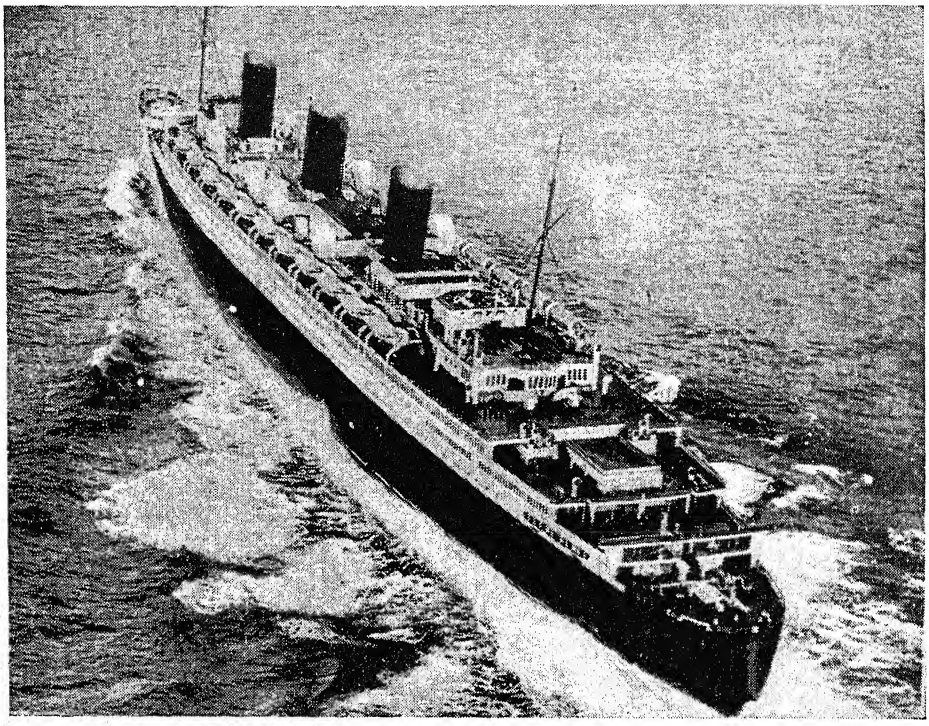
TANKS
STARBOARD PROPELLER SHAFT
STARBOARD PROPELLER
RUDDER
ASHWELL WOOD


THE "NEW" MAURETANIA
A FAST INTERMEDIATE PASSENGER LINER
WIRELESS AERIALS
FORECASTLE
CARGO HATCHES
STREAMLINED FUNNELS
NAVIGATING BRIDGE
THIRD CLASS SPORTS DECK
CABIN CLASS SPORTS DECK
No 1 BOILER ROOM
TURBO GENERATING ROOM
No 2 BOILER ROOM
WATERTIGHT BULKHEADS
ENGINE ROOM
OIL FUEL TANKS
KEY TO NUMBERS
1. CREW'S QUARTERS
2. STEWARDS' QUARTERS
3. THIRD CLASS CABINS
4. REFRIGERATED SPACE
5. CARGO
6. FRESH WATER TANKS
7. LIFT
8. CABIN CLASS CABINS
9. CABIN CLASS DINING SALOON
10. THIRD CLASS DINING SALOON
11. KITCHEN STORES
12. KITCHENS
13. SERVICE ROOMS
14. LIFT
15. TOURIST CLASS DINING-ROOM
16. TOURIST CLASS CABINS
17. SWIMMING POOL
18. LIFT
19. CAR STOWAGE
20. CARGO SPACE
21. TOURIST CLASS CABINS



THE "QUEEN MARY"

Fig. 2. *This aerial picture of the famous Cunard liner gives a vivid impression of her giant size and power. Built on the Clyde at a cost of £5,000,000, she is a triumph of the shipbuilding industry. She was built to carry 2,000 passengers and has over 1,000 crew. Her four propellers are probably the largest ever constructed, each weighing thirty-five tons. She was launched by H.M. Queen Mary in 1934, and made a record day's run on her first trip to New York*

existing could easily be transformed from freighter into warship. Speed and manœuvrability usually governed the selection, whenever it became necessary, and many merchantmen, being armed, were well able to look after themselves.

Something similar happened when war broke out in 1939, though merchant ships had not been designed fundamentally to be armed.

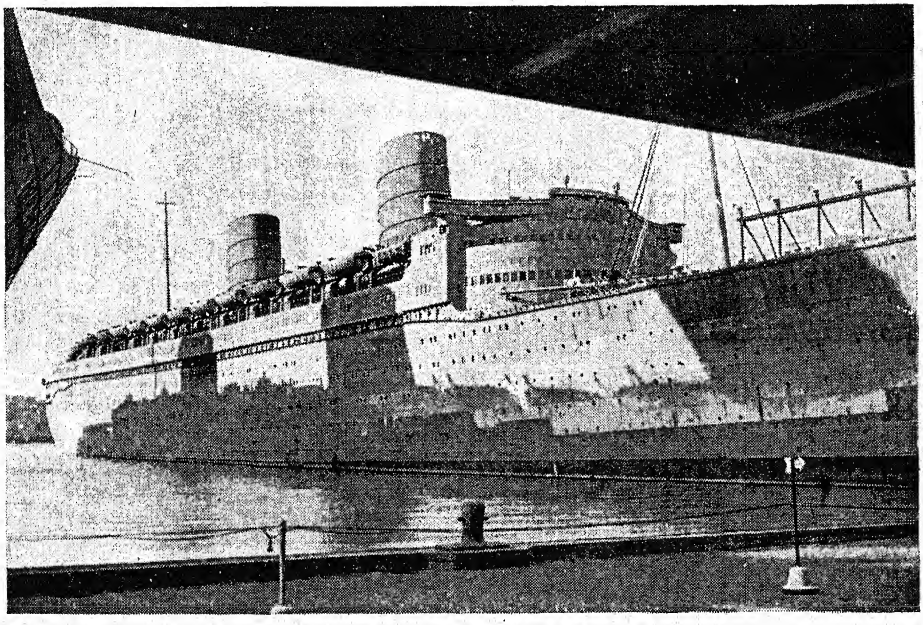
First and foremost among the ship types, by reason of size, prestige, luxury of equipment and speed, is the passenger liner, ranging from the *Queen Mary* and *Queen Elizabeth* (Figs. 2 and 3)—floating palaces—down to relatively small vessels like, say, the *Rangitiki* (Fig. 4), which in peace time ran to New Zealand via the Panama Canal; a ship of nearly 17,000 gross tons with a large passenger capacity and, incidentally, a fairly big cargo space insulated for the carriage of frozen meat. Ships of this class have sometimes been dubbed Empire food ships, but the *Rangitiki* is a passenger vessel as much as a cargo vessel. Between the 85,000 gross tons of the *Queen Elizabeth* and the 17,000 tons of the *Rangitiki*, there is an enormous gap, bridged by many fine ships. The *Georgic* of nearly 27,000 gross tons (Fig. 5) is a case in point. This fine ship carries in normal times, 504 cabin class and 551 tourist class, as well as 466 third-class passengers, across the Atlantic, and, in

addition, manages to find space for over 500,000 cubic feet of cargo. That is rather like imagining a big double row of shops in a busy town's main street, provisioned with all kinds of freight, being transported across the Atlantic inside one ship. Another good example is the *Dominion Monarch*, built to link Great Britain with South Africa, Australia and New Zealand (Fig. 6).

The internal characteristics of passenger liners vary much according to the route on which they run. In peace time, for example, a 23,000 tonner, trading to the Far East via the Mediterranean, differs from a ship operating on the North Atlantic, if only because the hotter-weather route calls for wide open decks.

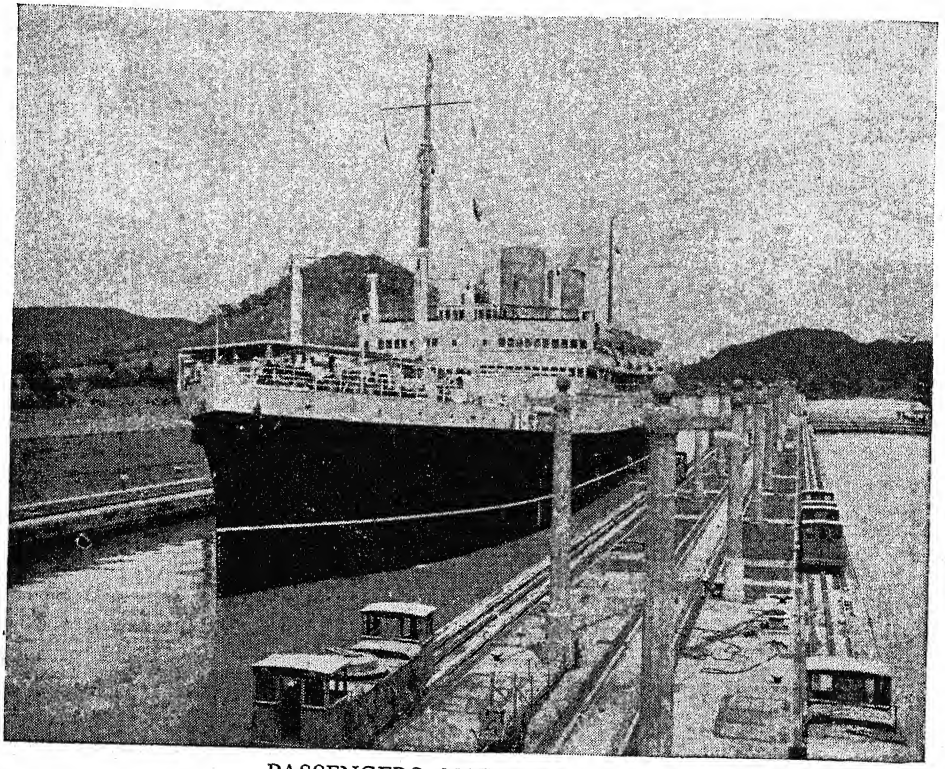
The best way to think of a passenger vessel is to imagine the largest luxury hotel which has ever been built, in a street of shops, with an electric power station, capable of operating the lighting for the whole of the town. In the days before the second World War, this floating hotel travelling at twenty-five to thirty knots, offered the most wonderful food to be found anywhere; and the wine cellars of the big transatlantic mammoth ships had a magnificent tradition. A liner of over 48,000 tons carries enough fuel oil to drive 55,000 motor cars a distance of 625 miles. Her electrical equipment could provide light for a city of more than 200,000 inhabitants.

What influences the great aeroplane of today will have on the big passenger ship of about 800 feet in length and with between 130,000 to 140,000 h.p. in her engine-room is a matter of conjecture. Will passengers, who are willing to pay highly to travel as fast as a ship can be driven through the sea, be prepared to pay a still higher fare to be transported at



BRITAIN'S QUEEN OF THE SEA

Fig. 3. *Robbed by war of her rightful place in transatlantic travel alongside the "Queen Mary," the "Queen Elizabeth" was "Queen Mary's" sister ship. Her design was affected by that of the "Normandie," whose shadow is cast upon her side as the ships lie in harbour in New York*



PASSENGERS, MAIL AND CARGO

Fig. 4. *One of the finest passenger and mail liners engaged in the United Kingdom—New Zealand service, the "Rangitiki" introduced oil-engine drive to this trade, which demanded big, fast, luxurious ships. Nearly 17,000 tons gross, the "Rangitiki" has a large passenger capacity and has also considerable cargo space, insulated for the carriage of frozen meat*

an even greater speed—the shortening of the passage offering them compensation for reduced space and the absence of many of the amenities of the ship of the sea? Will another *Queen Elizabeth* be built?

It is likely that we shall see a compromise between the supporters of the liner and the aircraft, though the future of the mammoth liner may well be in jeopardy. Many of the beautiful ships operating to the Cape, to South America, to the Far East and elsewhere will probably continue to be built, but their internal structure and the luxury of the accommodation may be varied. Since many wealthy passengers and people in a hurry will travel by air the ships will be provided for travellers of more modest means, as well as for special freight—too heavy or too bulky to be carried in the aeroplane. Full details of a luxury passenger ship will be found in the illustrations on pages 34 and 35.

The next type of ship, the cross-Channel vessel (Fig. 7), like the big passenger vessel, is likely to be affected considerably by air travel. Every night before the second World War there radiated from ports of the British Isles and from the coasts of the Continent, numbers of fast, streamlined, beautifully equipped little vessels of this class. By day, too, these luxury services ran regularly as clockwork over the Channel, and these efficient ships were the

indispensable links of pleasure and business between Britain and the Continent.

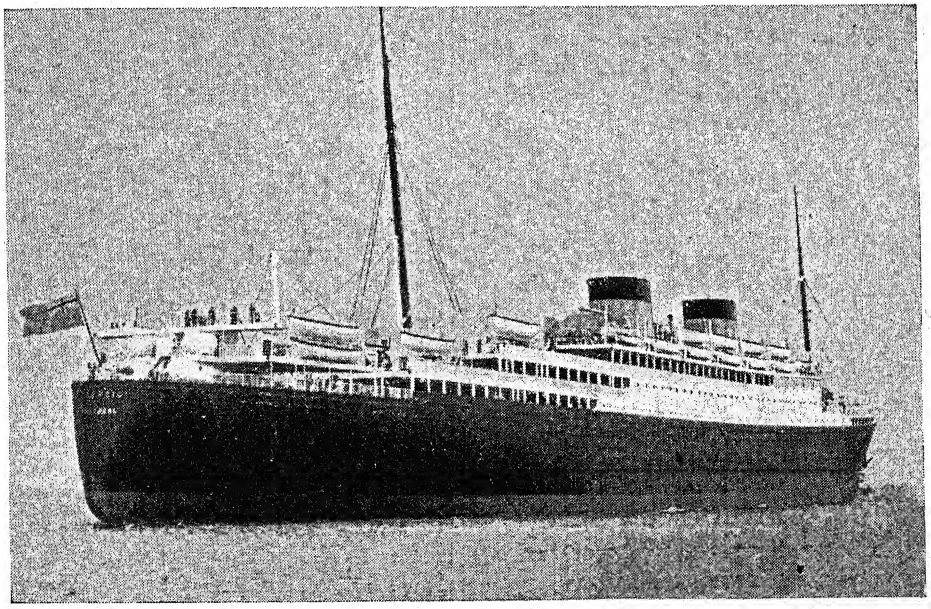
The cross-Channel ship can be regarded as a passenger liner in miniature. She has almost everything a passenger liner has. There are *suites de luxe*, comfortable dining saloons, special cabins on the upper decks, less comfortable cabins on the lower decks, smoking rooms, a recreation room and, last but not least, ample space for carrying special perishable cargo.

The cross-Channel ship, too, adopted many of the big passenger liner's characteristics as regards appearance—high, piled-up decks, big streamlined superstructure, surmounted by squat funnels, fine hull lines, and—what is more—a speed closely resembling that of her big sisters. A census of cross-Channel ships, in September, 1939, revealed—in proportion to the total number—almost as many vessels capable of a speed of over twenty knots as in the bigger ocean-going class.

Let us take a typical night-service vessel of this class. It is true that her gross tonnage is under 4,000, but with a speed of twenty-one knots, she can carry 700 first-class and 800 second-class passengers. Some of the day-service vessels, of slightly less tonnage and greater speed, were very popular. They found space for over 1,200 passengers, and at the same time carried two or three "shops full" of cargo.

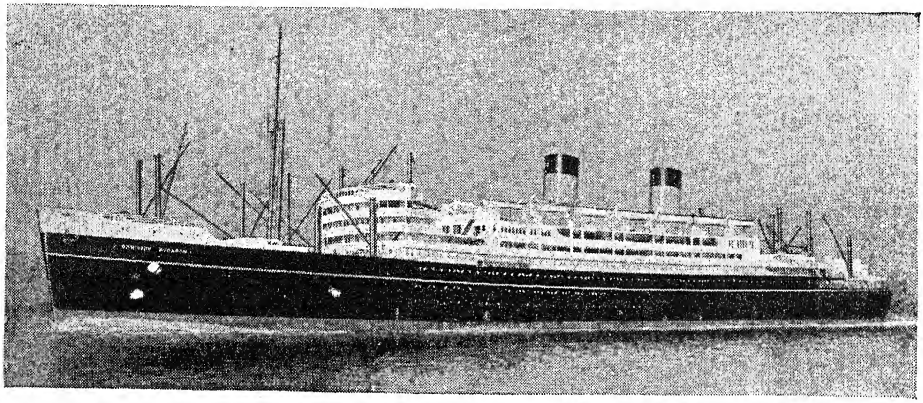
CARGO LINERS

Next in the list of ship types, in order of size, though not necessarily in importance, is the cargo liner. When Kipling wrote about the liner "being a lady" and the cargo ship very much the reverse, there were no cargo liners. There was then a very sharp line of demarcation between the passenger vessel and the tramp.



THE MOTOR-PROPELLED "GEORGIC"

Fig. 5. *Smaller than the "Queen Elizabeth" and the "Queen Mary," the "Georgic," 27,000 gross tons, is nevertheless a magnificent Transatlantic ship. In addition to accommodating over 1,500 passengers, in normal times she can carry over half a million cubic feet of cargo*



THE "DOMINION MONARCH"

Fig. 6. *Another fine example of Empire ships is the "Dominion Monarch." Possessing no less than four screws for propulsion, this motor-ship is unique among the passenger and mail liners of Great Britain. She formed a valuable link in the Empire chain, maintaining a service to New Zealand and Australia. Her oil engines are remarkable for their economy of operation*

But the cargo liner does exactly the same things with special cargo as the passenger liner does with passengers and mail; she runs to a rigid schedule, usually between two ports only, at the highest possible speed. Because of her speed and the completeness of her equipment, she is able, however, to offer facilities for upwards of a dozen passengers. The law requires that if a ship carries more than a dozen passengers, it is *ipso facto* a passenger liner, and all the Board of Trade regulations regarding safety of life at sea which apply to a passenger liner must be strictly observed. Many shipowners provide the extra equipment in their cargo liners, and endeavour to bridge the gap between the cargo liner proper and the passenger liner by providing space for upwards of a hundred passengers.

ADVANTAGES OF OIL FUEL

The cargo liner is a product of the last two and a half decades. Nor in any subdivision of cargo liners must we omit the Empire food ship (Fig. 8), of which many particularly fine examples have come from the famous Belfast shipyards of Messrs. Harland & Wolff.

In their many big holds and 'tween decks (as the various deck levels are called), upwards of 500,000 cubic feet are available for refrigerated cargo. It is difficult to visualize 500,000 cubic feet, and more helpful to look at it in terms of mutton, beef, pigs and so on. One ship of this type can carry 137,000 individual carcasses of mutton, and in another part of her hold space she is able to stow 13,000 bales of wool. Such a ship is over 400 feet long, has a deadweight tonnage of 10,390 tons, and steams or motors some seventeen land miles an hour. It would require several thousand lorries to transport such a load on land. Such a ship is illustrated on pages 42 and 43.

When we talk of a ship motoring, we mean that she is a motor-ship propelled by enormous engines of similar type to those which drive London buses. Many modern ships are motor-ships which must always use oil. Steamers can use oil or coal because they have boilers, but numbers of modern steamers, such as passenger liners in which cleanliness is essential, burn oil only. It is not only clean, but much more handy than coal to take

aboard and store space for storage of fuel on ocean trade routes is a vital matter.

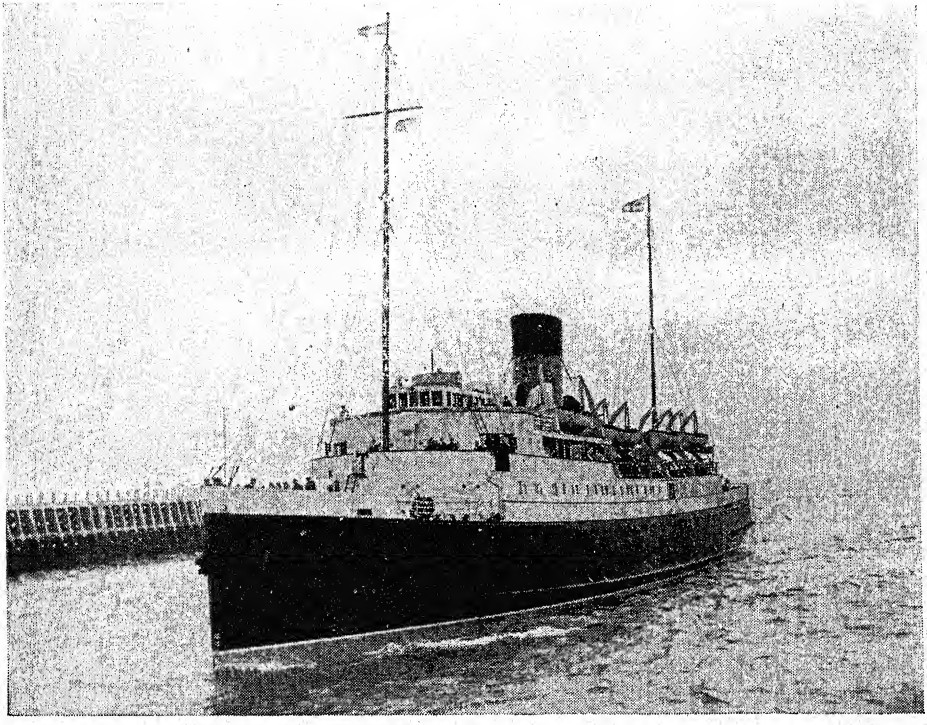
Looking again to the future, many people consider that the cargo liner, or Empire food carrier type, is one of the most important and one that should be still far more developed. They suggest that she will steam at even more than seventeen land miles, but with the same amount of carcases of mutton, or an equivalent number of bunches of bananas or cases of apples, pears, plums, or grapefruit, or even perhaps other perishable foodstuffs. In time to come, the type will no doubt be built in increasing quantities. It is urged that the streamlined fast vessel of this kind could do much of the work formerly done by the passenger liner.

In normal times cargo liners may be found on the main routes radiating from British ports, South Africa, New Zealand via Panama, Australia via the Cape, the Pacific north-west coasts via Panama, and other important lines of communication which are dealt with fully in Chapter 6.

SPECIALIST FOOD CARRIERS

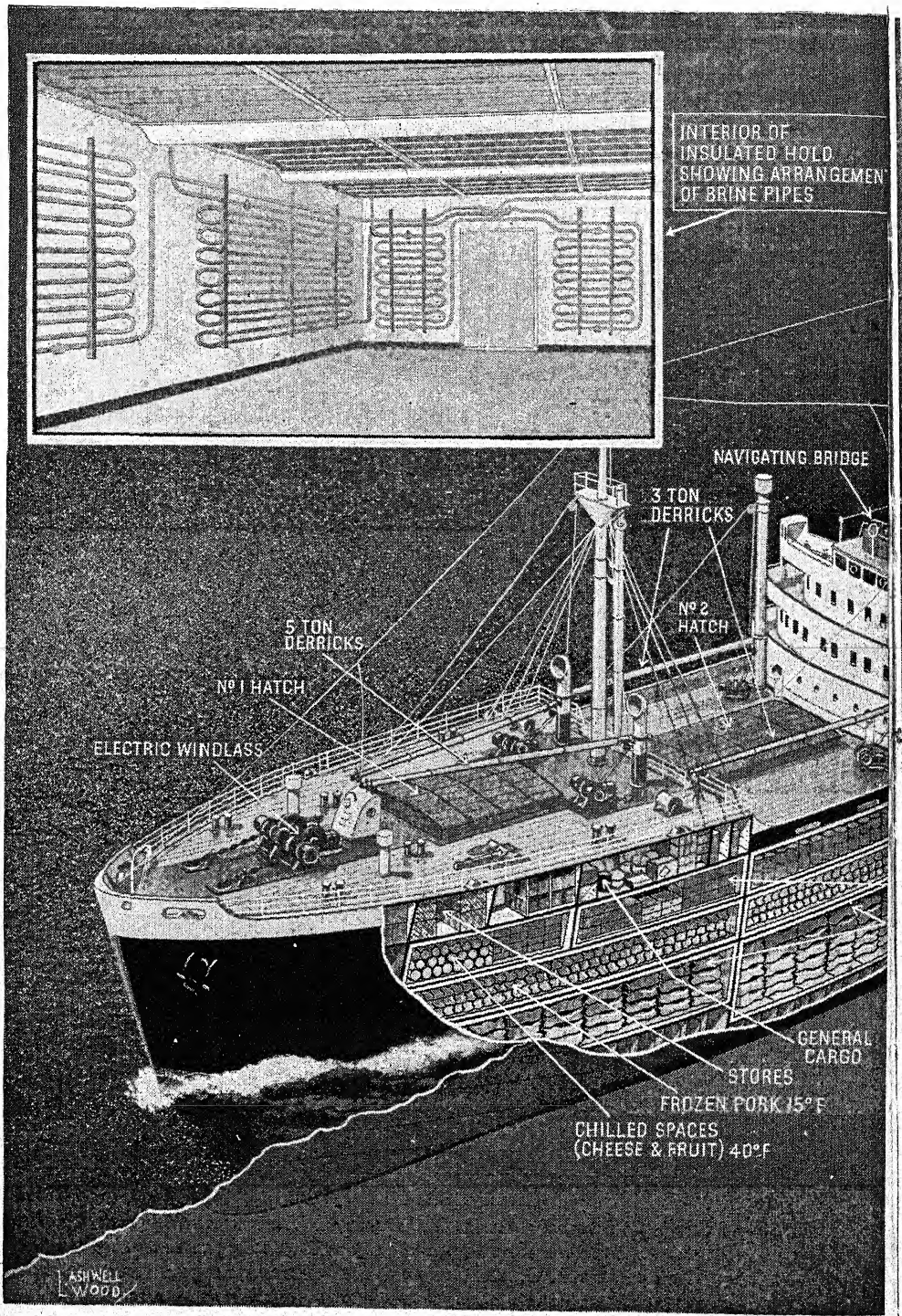
There are two main classes, the meat and dairy produce carrier, and the fruit ship. This again is specialized so as to provide for the carriage of bananas only or other kinds of fruit. Generally, the fruit ship is smaller than the meat ship. Both are specialist cargo liners.

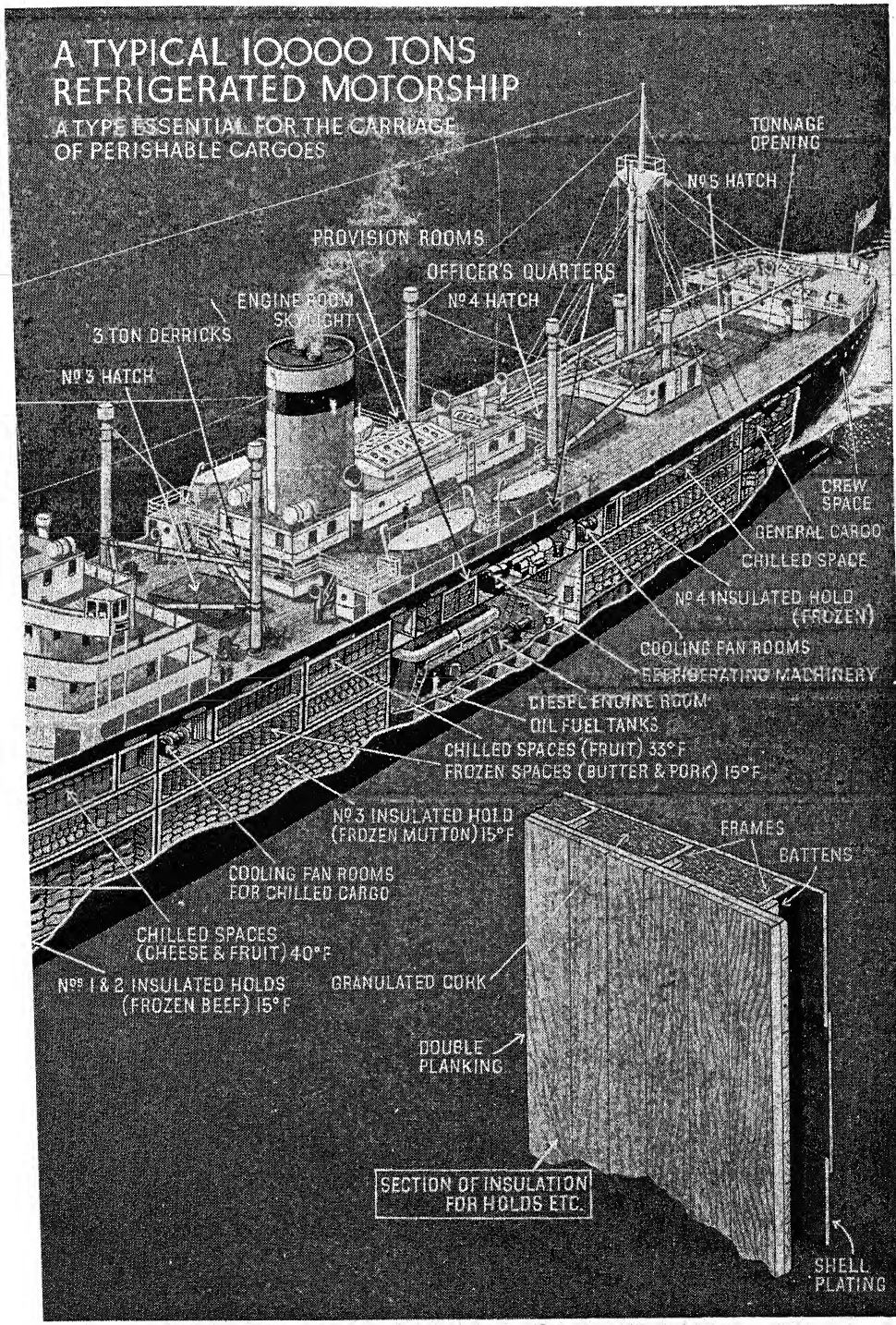
The cargo liner, it may be claimed, is beginning to encroach on the duties

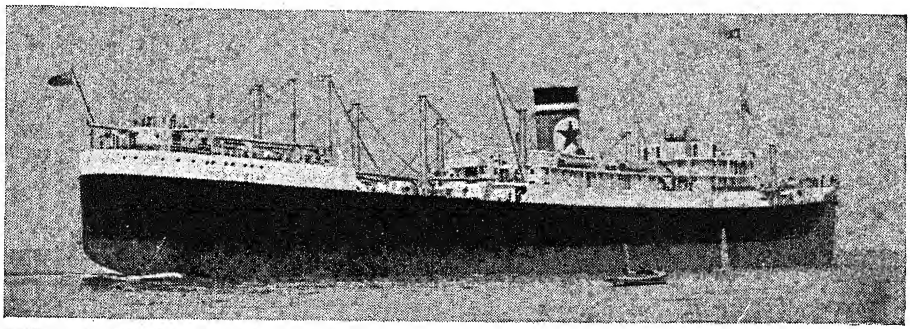


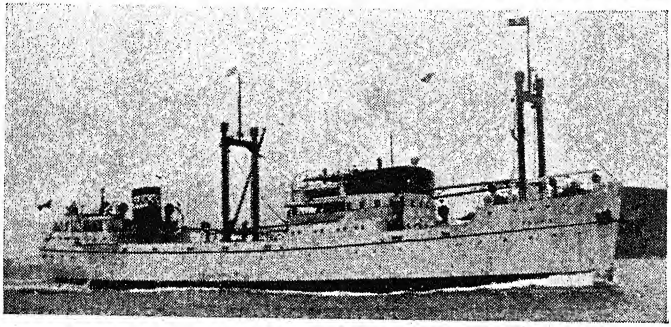
CROSS-CHANNEL SHIPS

Fig. 7. *Cross-Channel ships can be described as liners in miniature, resembling their big sisters in their smart streamlined appearance. Fast and comfortable, in happier times they were links of pleasure and business between Great Britain and the Continent, carrying passengers, motor cars and mail by day and night services across the narrow seas*


INTERIOR OF INSULATED HOLD SHOWING ARRANGEMENT OF BRINE PIPES
NAVIGATING BRIDGE
3 TON DERRICKS
Nº 2 HATCH
5 TON DERRICKS
Nº 1 HATCH
ELECTRIC WINDLASS
GENERAL CARGO
STORES
FROZEN PORK 15° F
CHILLED SPACES (CHEESE & FRUIT) 40° F
ASHWELL WOOD

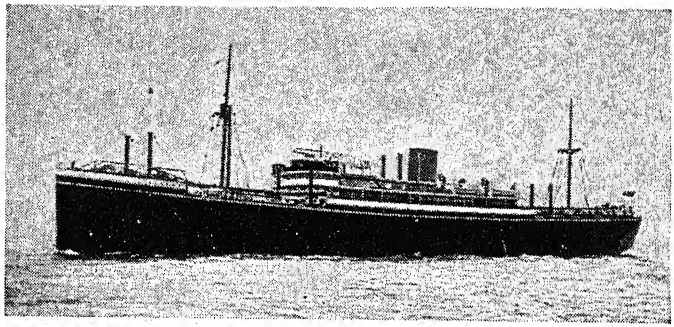

A TYPICAL 10000 TONS
REFRIGERATED MOTORSHIP
A TYPE ESSENTIAL FOR THE CARRIAGE
OF PERISHABLE CARGOES
TONNAGE OPENING
No 5 HATCH
PROVISION ROOMS
OFFICER'S QUARTERS
ENGINE ROOM SKYLIGHT
No 4 HATCH
3 TON DERRICKS
No 3 HATCH
CREW SPACE
GENERAL CARGO
CHILLED SPACE
No 4 INSULATED HOLD (FROZEN)
COOLING FAN ROOMS
REFRIGERATING MACHINERY
DIESEL ENGINE ROOM
OIL FUEL TANKS
CHILLED SPACES (FRUIT) 33°F
FROZEN SPACES (BUTTER & PORK) 15°F
No 3 INSULATED HOLD (FROZEN MUTTON) 15°F
FRAMES
BATTENS
COOLING FAN ROOMS FOR CHILLED CARGO
CHILLED SPACES (CHEESE & FRUIT) 40°F
Nos 1 & 2 INSULATED HOLDS (FROZEN BEEF) 15°F
GRANULATED CORK
DOUBLE PLANKING
SECTION OF INSULATION FOR HOLDS ETC.
SHELL PLATING





(Above) Empire food ship, with cargo capacity of half a million cubic feet for meat cargo; (Left) Fast ship plying between Australia and U.S. with cargoes of lumber and copra

(Right) Another Empire food ship trading with New Zealand, carrying refrigerated meat cargo and dairy produce; (Below) General cargo carrier equipped with special derricks



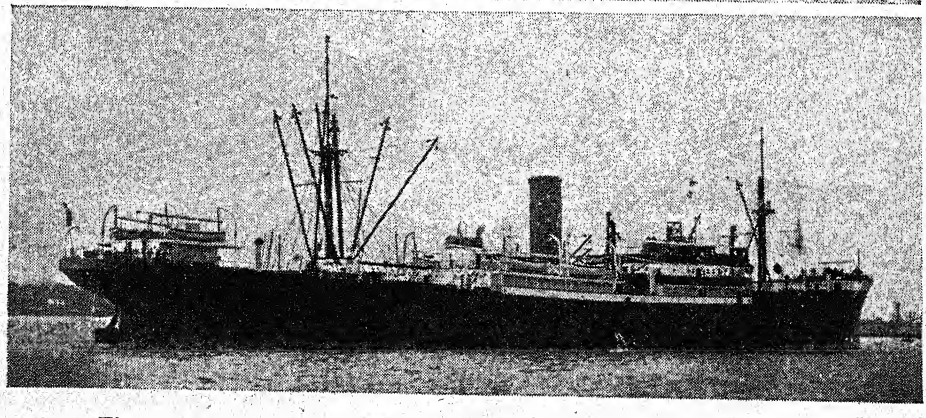


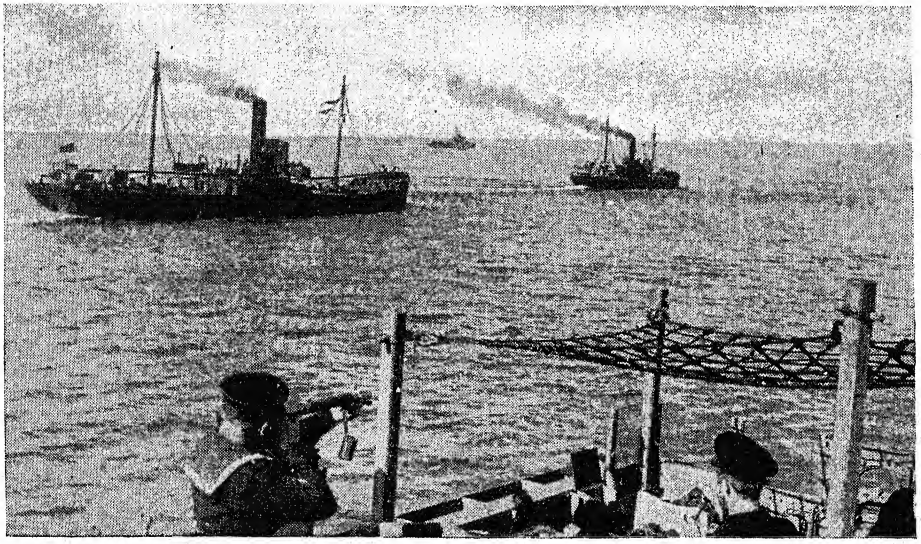
Fig. 8. SPECIALIST CARGO CARRIERS—EMPIRE FOOD SHIPS

formerly carried out exclusively by the passenger liner. This is probably true. It is certainly correct that the tramp is doing much of the work which was formerly carried on, especially in the early days after the first World War, by the cargo liner.

THE UNIVERSAL TRAMP

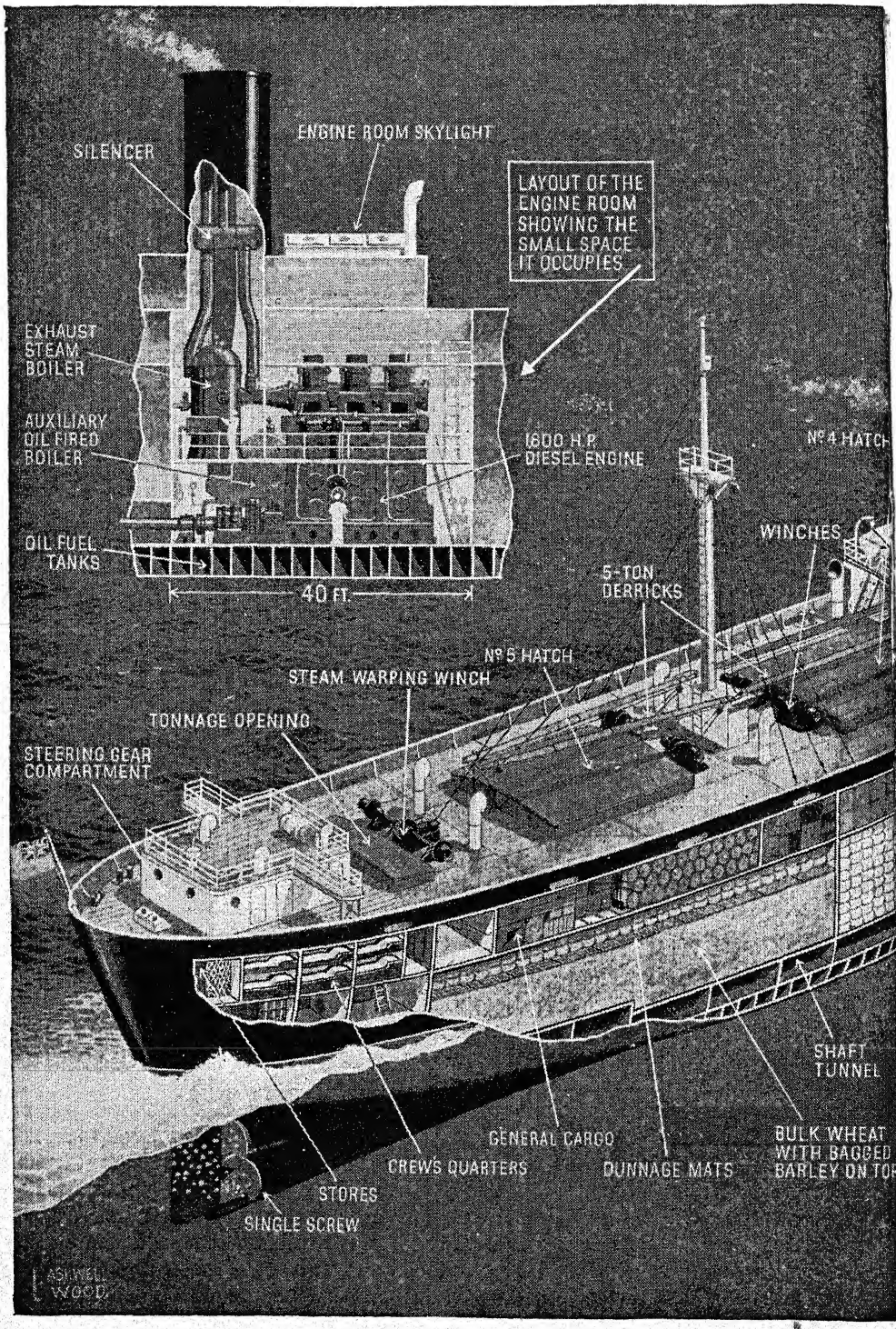
The tramp (Fig. 9) is a maid of all work. Many people say that in the future the tramp will continue to hold the same important position as hitherto, but others declare that its day is over because specialization will be the new order. It is probable, however, that tramps will continue as the general servants of industry for many years. They are handy ships, most of them capable of carrying about 9,000 tons of cargo, the equivalent of about four huge coal dumps which may be seen alongside a quay at a South American port. Despised though the tramp may be by some of the liner companies, she is, nevertheless, a tricky ship to design. Her owner does not know what cargo his ship may get or where she will have to go; what kind of fuel she will have to burn; what waters his ship will go into. All this is fixed in an international chartering market, usually the Baltic Exchange in London, the centre of the world for these matters.

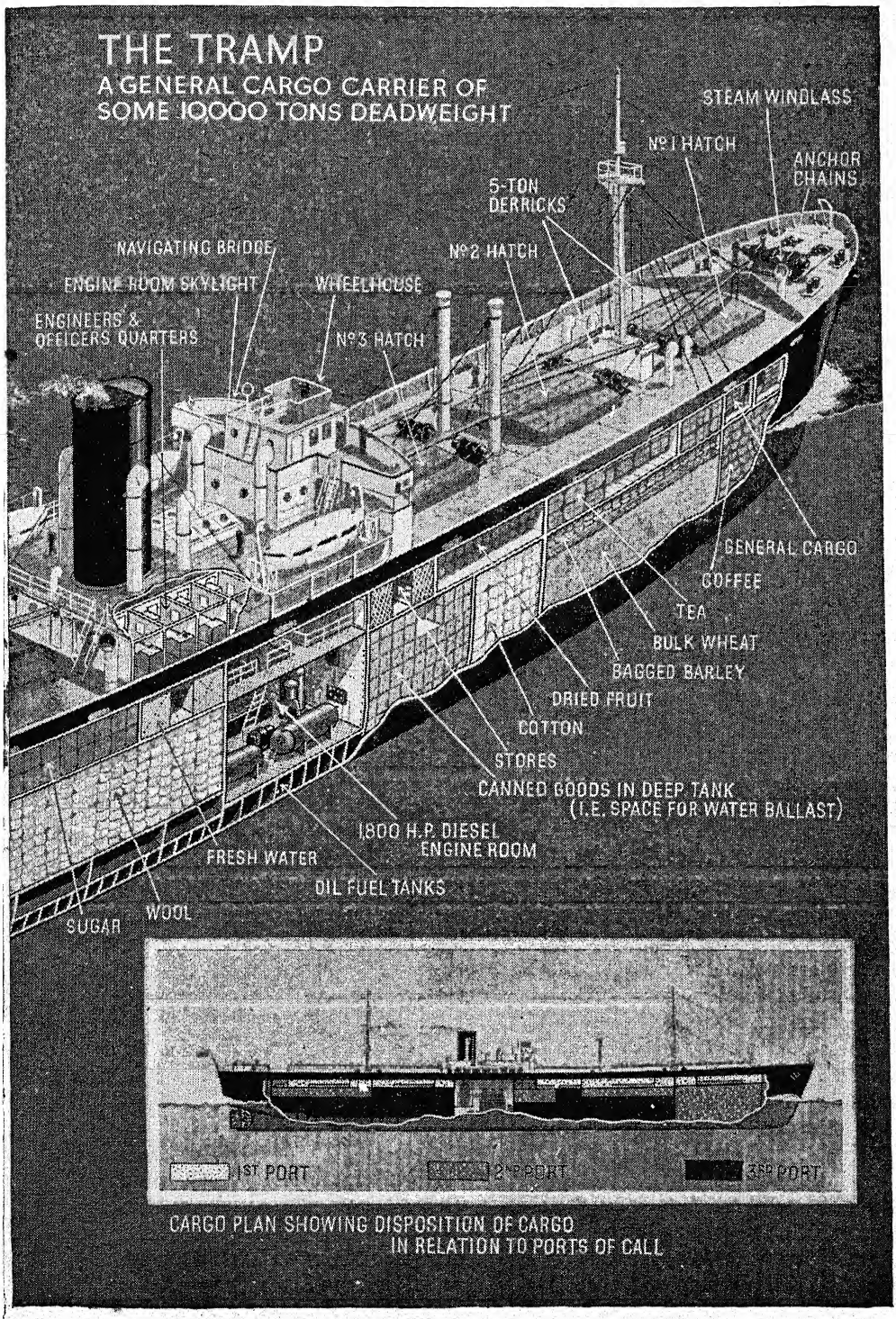
Tramps carry a tremendous variety of cargoes. Tramp ships may be chartered for work for a few months in the Pacific, may then have to carry lumber or scrap iron between North America and Japan, which may easily be followed by a cargo of case oil—i.e., oil in tins—between California and Australia. On occasion, she may have to load a cargo of ore of various kinds, and bring it home to smelting plants. The holds, therefore, must be strong; the cargo-handling gear equally strong and reliable; hatches must be as large as possible. Accommodation for the crew must be comfortable, but cannot be luxurious. The tramp ship is a cheap



TRAMPS IN CONVOY

Fig. 9. *In peace time a general servant of the sea, the tramp is taking her full share in the battle of the Atlantic. An escorting destroyer, from which this picture was taken, keeps watch on a convoy entering U-boat areas, through which the convoy passed without loss*


SILENCER
ENGINE ROOM SKYLIGHT
LAYOUT OF THE ENGINE ROOM SHOWING THE SMALL SPACE IT OCCUPIES
EXHAUST STEAM BOILER
AUXILIARY OIL FIRED BOILER
1600 H.P. DIESEL ENGINE
OIL FUEL TANKS
40 FT
Nº 4 HATCH
WINCHES
5-TON DERRICKS
Nº 5 HATCH
STEAM WARPING WINCH
TONNAGE OPENING
STEERING GEAR COMPARTMENT
SHAFT TUNNEL
GENERAL CARGO
BULK WHEAT WITH BAGGED BARLEY ON TOP
CREWS QUARTERS
DUNNAGE MATS
STORES
SINGLE SCREW
ASHWELL WOOD



CARGO PLAN SHOWING DISPOSITION OF CARGO
IN RELATION TO PORTS OF CALL

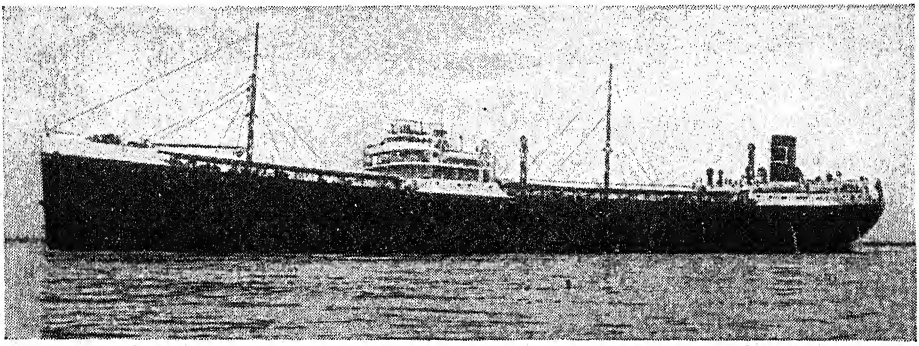
vessel in first cost, and must be equally cheap to her owners in running cost.

As shipbuilding technique improved in the fifteen years preceding the second World War, tramps became more efficient. They increased in size until they resembled some of the big ships which have been mentioned, and they increased in speed. Before the first World War about six knots was considered to be ample for a vessel to wallow out, loaded with coal, to the Plate. Now at least twelve knots is considered necessary.

So there is the tramp—a maid of all work. If she occasionally appears dirty, then it's the fault of the cargo she carries, and the fact that she may never be in the same port twice for many years. Full details of a typical tramp are given in the illustrations on pages 46 and 47.

Most tramps today are what is known as flush-deckers, that is to say, the topmost or weather deck is level fore and aft, but some of the older ones were known as three-island ships, having a building forward known as a fo'c'sle, one amidships known as a bridge or centre castle, and one aft, known as a poop. The term three-island was formerly due to the fact that these excrescences were literally islands when the ship was loaded, and running in stormy weather, with waves crashing on board all the time. A tramp carrying 9,000 tons of cargo has four hold spaces and two decks. Each hold space has a large hatch. Goods can be lowered into or raised from these holds by derricks on the masts. The propelling machinery is placed amidships.

We have mentioned ore carriers, but reference should be made to some vessels which can carry nearly 15,000 tons of ore in specially arranged holds, on a fixed route. On the other hand, it would be just as possible to use them—provided they were not too big for the ports—on other routes. The ore carrier can often run as an ordinary tramp when business in the ore trade is bad. A tramp, too, carries ore cargoes when the demand is brisk. But the specialized ore carrier usually has her machinery aft, and in convoy might well be mistaken for an oil tanker.

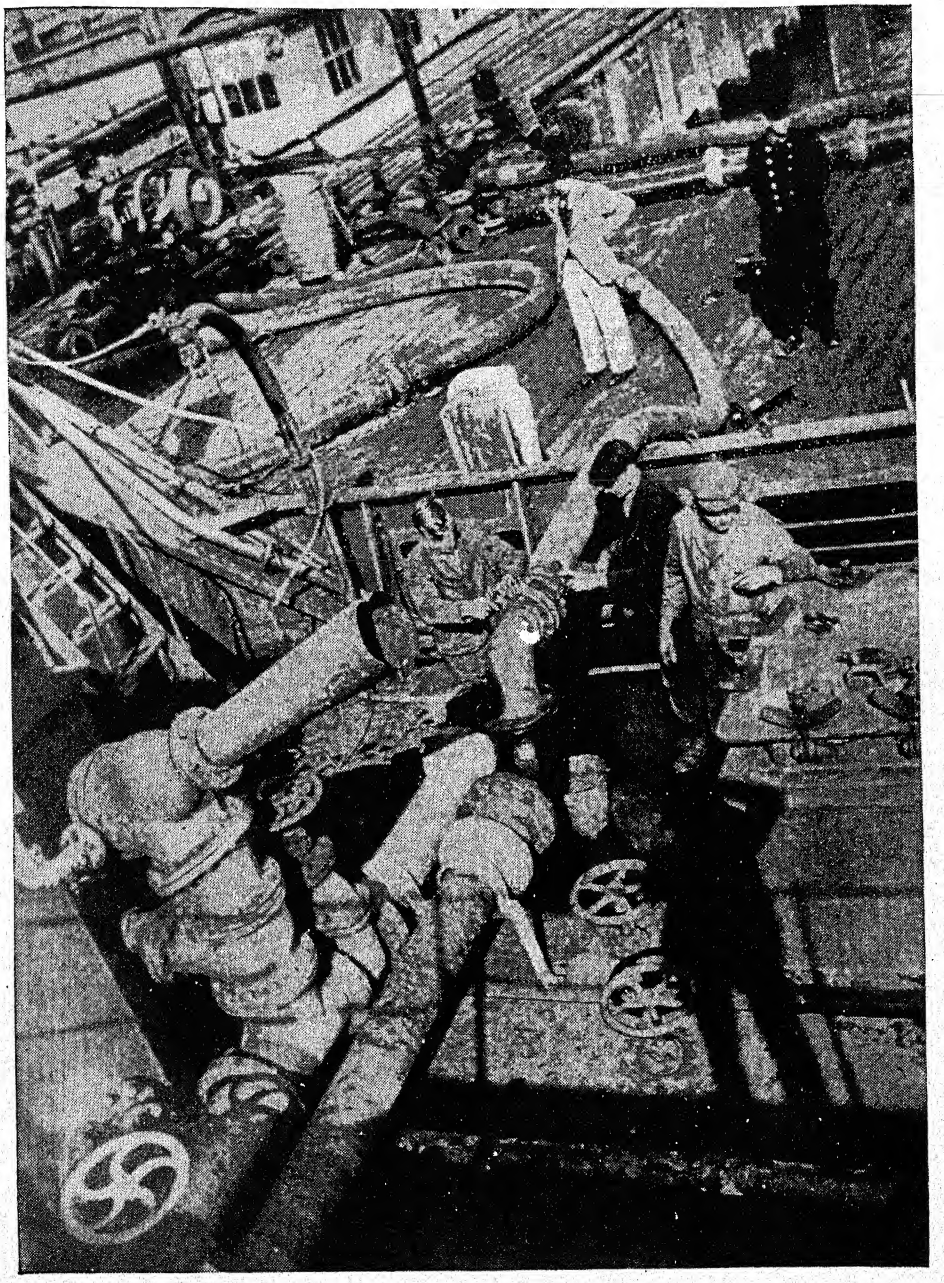


A TYPICAL OIL TANKER

Fig. 10. *The M.T. "Orville Harden," one of the largest tankers, carries a liquid cargo of 15,000 tons. Strong steel bulkheads run fore and aft, and are divided to make transverse bulkheads, forming huge tanks to hold the oil. The engine-room and funnel are aft to minimize risk of fire; the bridge and crew's quarters are amidships. Pumps are installed for unloading*

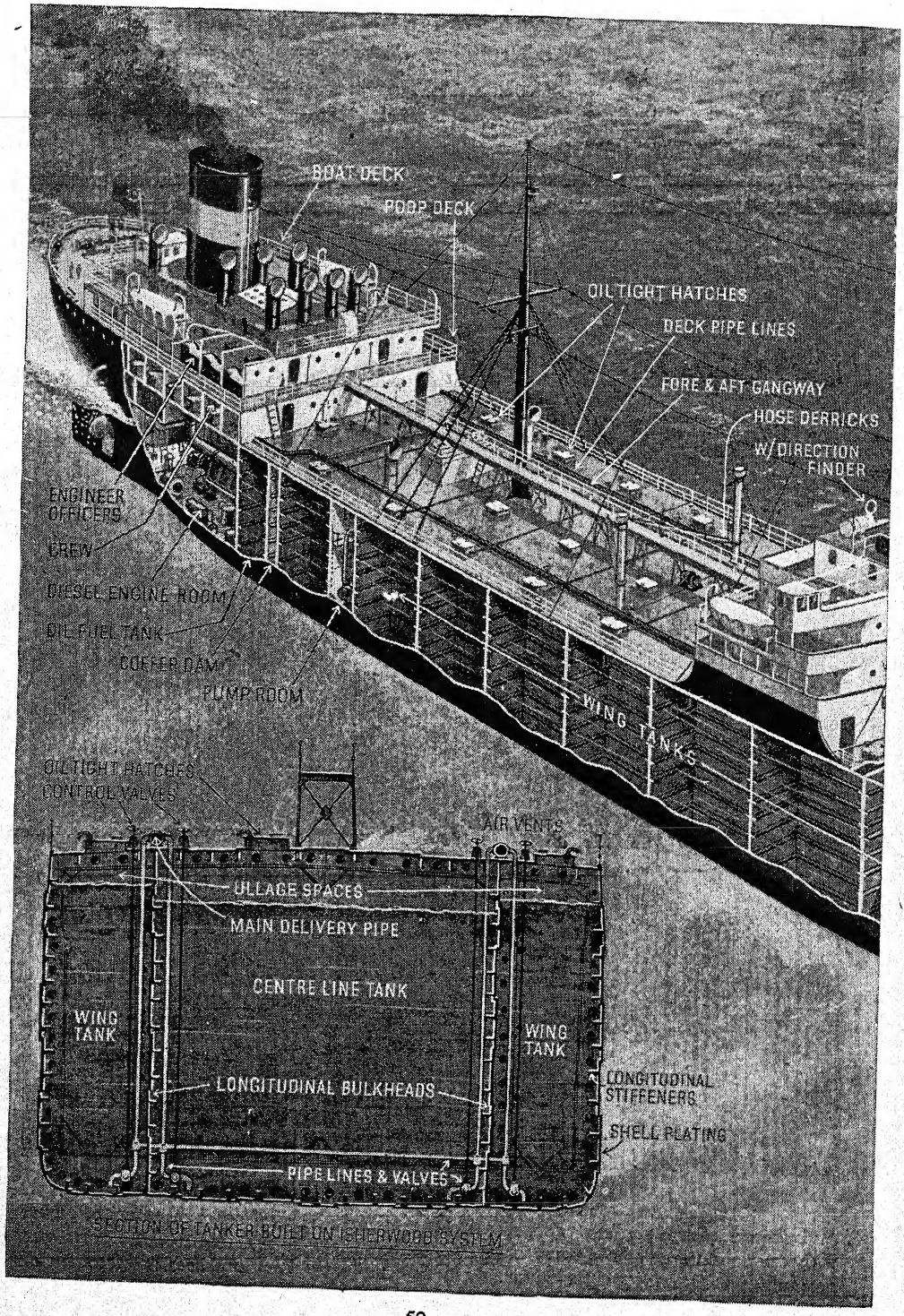
OIL TANKERS

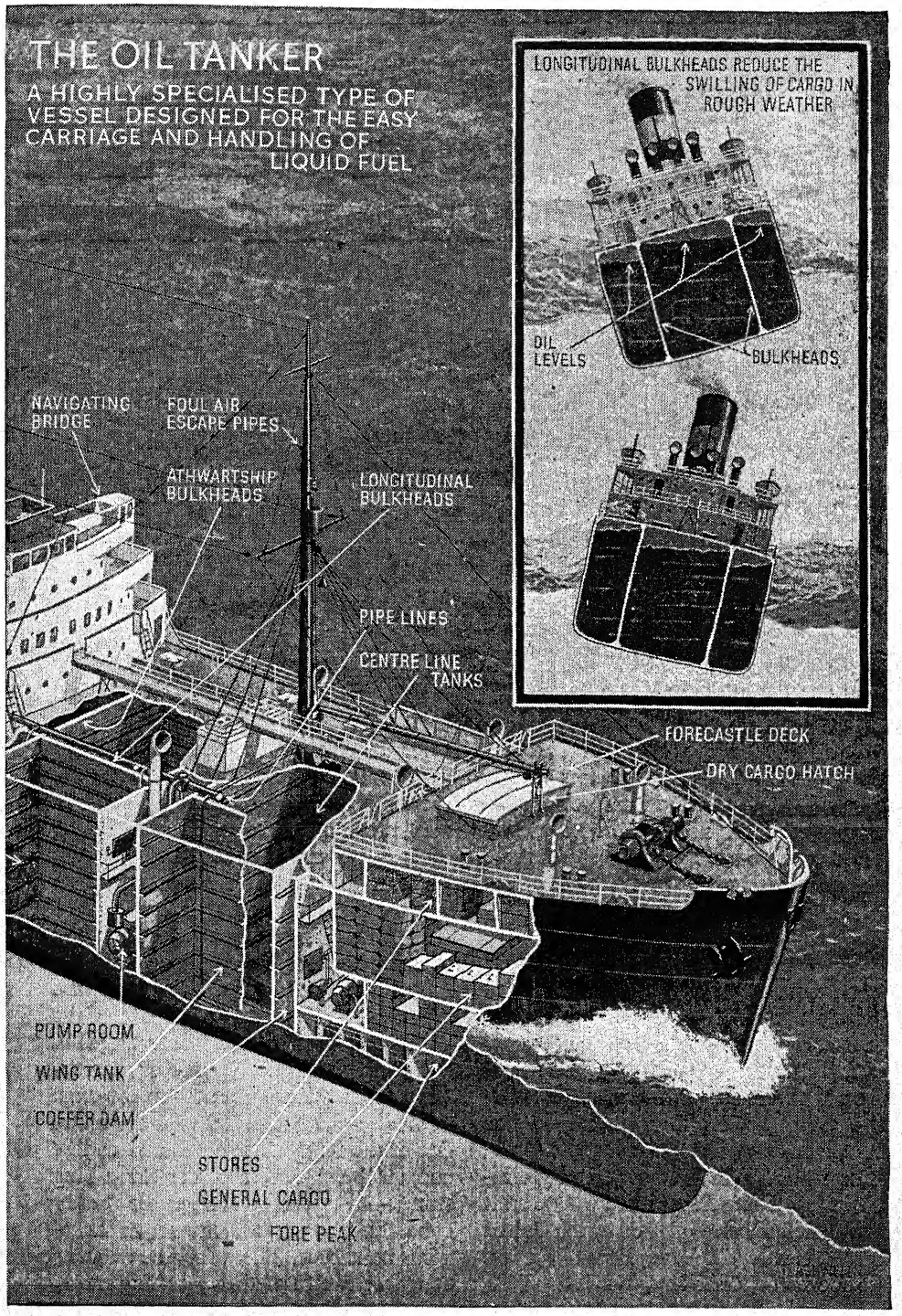
Oil tankers are among the most numerous and certainly the most important class of ships in the world today, and it is upon their safe running that war operations by sea, on land and in the air largely depend.

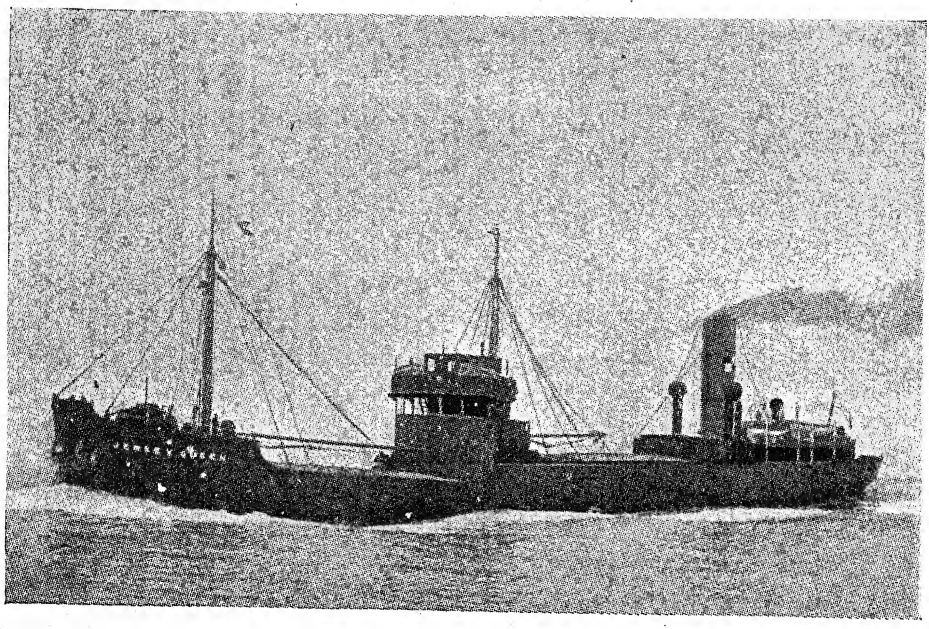


OIL TANKER UNLOADS CARGO

Safe in port after a perilous passage, a tanker discharges its vital cargo by means of pumps. This tanker was one of the many ships in a convoy which safely reached home ports after successfully withstanding repeated attacks by day and night from torpedoes and from the air


BOAT DECK
POOP DECK
OILTIGHT HATCHES
DECK PIPE LINES
FORE & AFT GANGWAY
HOSE DERRICKS
W/DIRECTION FINDER
ENGINEER OFFICERS
CREW
DIESEL ENGINE ROOM
OIL FUEL TANK
COFFER DAM
PUMP ROOM
WING TANKS
OILTIGHT HATCHES
CONTROL VALVES
AIR VENTS
ULLAGE SPACES
MAIN DELIVERY PIPE
CENTRE LINE TANK
WING TANK
WING TANK
LONGITUDINAL BULKHEADS
LONGITUDINAL STIFFENERS
SHELL PLATING
PIPE LINES & VALVES
SECTION OF TANKER BUILT ON ISHERWOOD SYSTEM


THE OIL TANKER
A HIGHLY SPECIALISED TYPE OF VESSEL DESIGNED FOR THE EASY CARRIAGE AND HANDLING OF LIQUID FUEL
LONGITUDINAL BULKHEADS REDUCE THE SWILLING OF CARGO IN ROUGH WEATHER
OIL LEVELS
BULKHEADS
NAVIGATING BRIDGE
FOUL AIR ESCAPE PIPES
ATHWARTSHIP BULKHEADS
LONGITUDINAL BULKHEADS
PIPE LINES
CENTRE LINE TANKS
FORECASTLE DECK
DRY CARGO HATCH
PUMP ROOM
WING TANK
COFFER DAM
STORES
GENERAL CARGO
FORE PEAK



IN THE COASTWISE TRADE

Fig. 11. *A typical example of the little vessels which carry freight coastwise and to near ports across the Channel, is the coaster "Jersey Queen" shown here. In normal times express services of coasters run between London and Liverpool, Newcastle and London, and other ports. They can off-load from big ships and take cargoes up narrow waterways to smaller ports*

At the beginning of the first World War there were under 1,500,000 gross tons of oil tankers. When war again broke out in 1939 the total had grown to nearly 11,000,000 tons. The biggest of these ships can carry 16,000 tons of liquid cargo.

BRITAIN'S LEAD

There are two classes of tankers. The clean tankers carry the clean oils, i.e., petrol, paraffin, etc. The dirty tankers transport the heavy fuel oils, lubricating oils, etc. Heating is necessary because, if the cargo were not warmed in cold weather the oil cargo might go solid. In one case, it had to be dug out of the tanks in winter weather in Liverpool. In September, 1939, Great Britain had the greatest number of tankers, followed by the United States, Norway, Holland, Panama, Japan, Italy, France, Germany, Sweden.

No survey of our merchant ships would be complete which did not include the enormous whale-oil factories which go to the Antarctic with attendant trawler-like catchers to capture and boil up the whales. Some whale factories are equipped to carry as much as 20,000 tons.

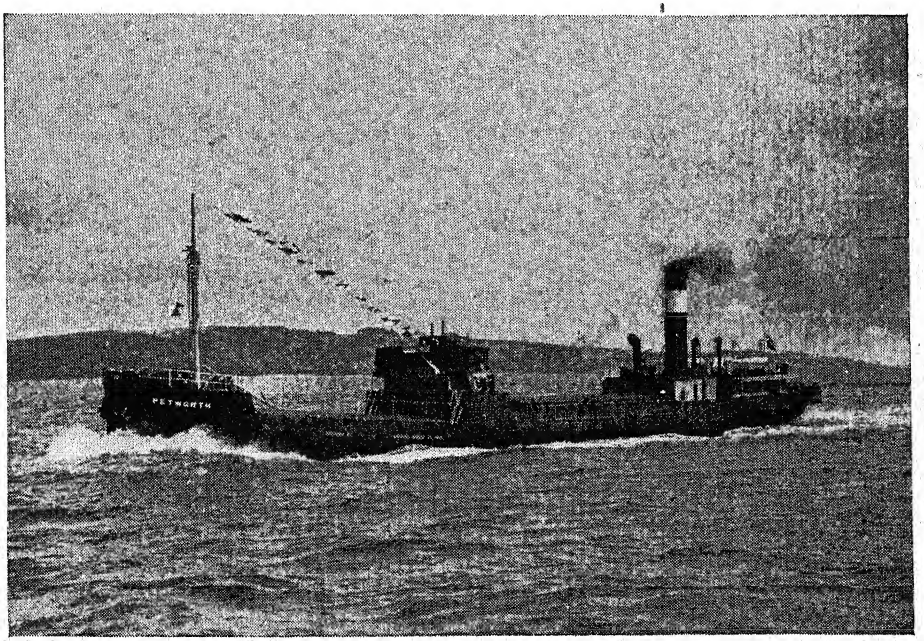
An oil tanker can be easily recognized because her machinery as well as her funnel is aft, and her bridge just forward of amidships (Fig. 10). The whole of the hold space, possibly 400 feet in length in a big ship, is divided by two steel structures running from the bow to the stern or vice versa, and parallel with the centre line of the ship. These are known as fore and aft bulkheads, and the three long trough-like spaces so formed are further subdivided by cross divisions, or transverse bulkheads. There may be as many as ten or twelve of these, making nearly

thirty individual tanks, into which and out of which oil must be moved by pumps with the greatest possible dispatch. These pumps control the oil flow in each of the three lines of compartments, and some of them are able to pump 2,800 gallons of fuel a minute. Other pumps keep the air pure to guard against explosions.

COASTERS AND COLLIERS

Most coasters, also, have their engines aft. The coaster (Fig. 11) as her name tells, carries freight coastwise. In normal times companies handling coasters ran express services between Newcastle and London, between London and Liverpool, and other ports. Much of the Newcastle-London traffic, consisting of coal, is handled by colliers. The collier is a stocky little ship, sometimes with engines aft, and sometimes with the machinery amidships (Fig. 12). Some colliers trade to the near Continent ports, returning with a cargo of pit props for the mines. Those colliers which come up the Thames as far as Fulham or Battersea, are known as flat-irons, because, with their hinging funnels aft—lowered to pass under bridges—and their low superstructure, they resemble this household article. Ships of this kind are a type exclusive to Great Britain.

Before the war, many Dutchmen were engaged in the coasting trade, and the shipyards of Northern Holland were turning out standard vessels, well equipped, fast, and capable of carrying upwards of 800 tons of cargo. Holland was extremely competitive, both with her own shipyards and shipowners. These little ships can off-load from big ships in main harbours, and take portions or parcels of cargo up narrow tortuous waterways, to semi-inland ports. This is a most useful ship type characterized by its good looks and efficiency.



THE BUSY COLLIER

Fig. 12. *Colliers are hard-working ships very familiar in East Coast ports and on the Thames. The ship above, built at Burntisland, is typical of many turned out in British shipyards for this important trade. 972 tons gross cubic capacity, 68,650 feet., her speed is 10½ knots*

The smaller motor coaster, carrying no more than 500 tons, has been a growing rival to the larger steam-driven short sea trader, such as the Baltic timber carrier, a three-island ship which carries some of her cargo on deck. Faster and smaller than the steamer, she can trade to a wide range of ports.

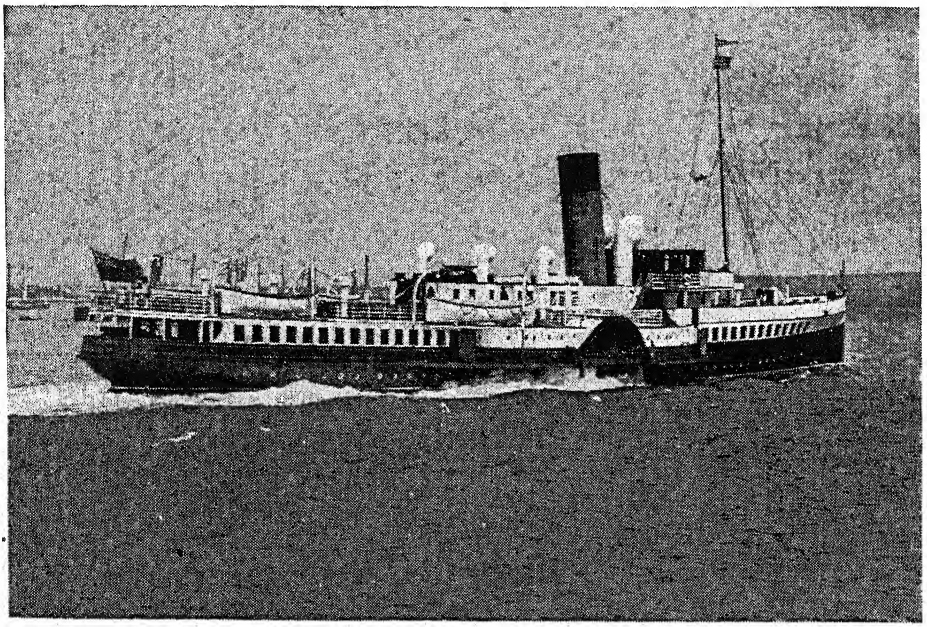
As a frequenter of the Narrow Seas and shoal water, the coaster is frequently a neighbour of the paddler. This is a type of excursion ship very popular on the Clyde, where it maintains regular passenger services, and on the south-east coast in summer time.

Many magnificent ships of this kind have been built in recent years, and the standards of speed, luxury and comfort for passengers have all increased. A typical excursion paddler is shown in Fig. 13.

A complete contrast to the paddler is the hard-working fishing vessel. In size and appearance she resembles the coaster.

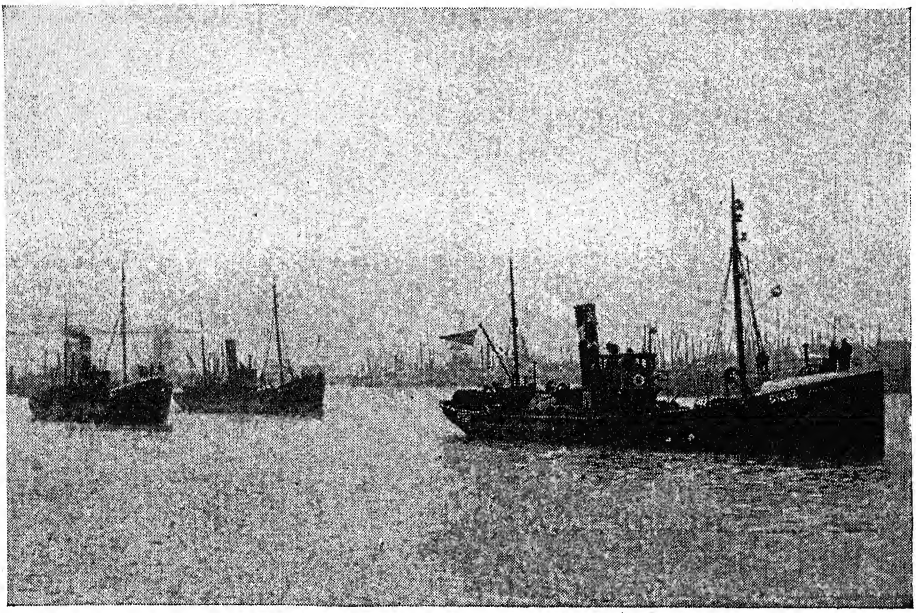
Two types operate from our ports, and the Royal Navy has considerable work for both in wartime. They are trawlers and drifters. The biggest is the trawler. She is a ship of over 100 feet in length, if she goes long-distance fishing in the White Sea. The smaller craft—intended mainly for work in the North Sea and round the coast—are considerably smaller.

Such vessels are characterized by their stocky appearance and by their ability to stand any pounding which the sea and wind may give them. In contrast to the ordinary cargo vessel, they run out light, i.e., with no fish cargo, but a full cargo of bunkers or fuel. They return with their fish holds full and bunkers almost empty.



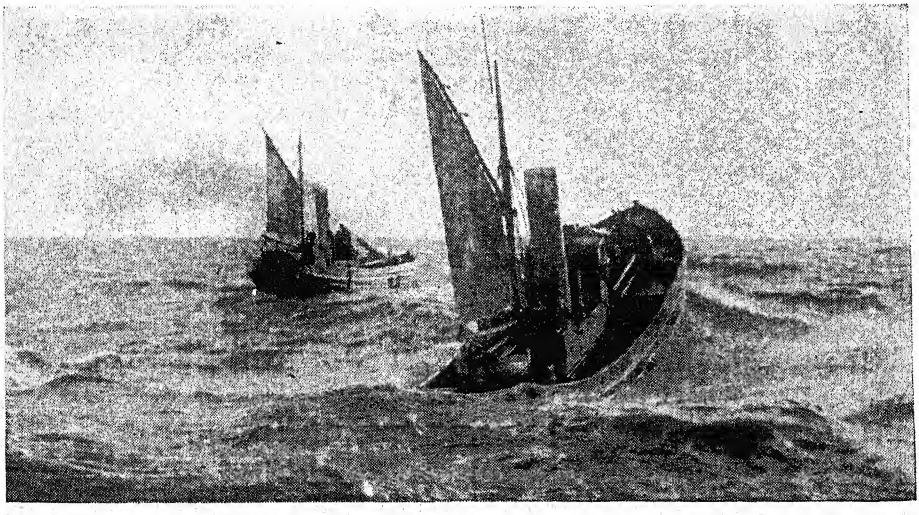
HOLIDAY SHIPS

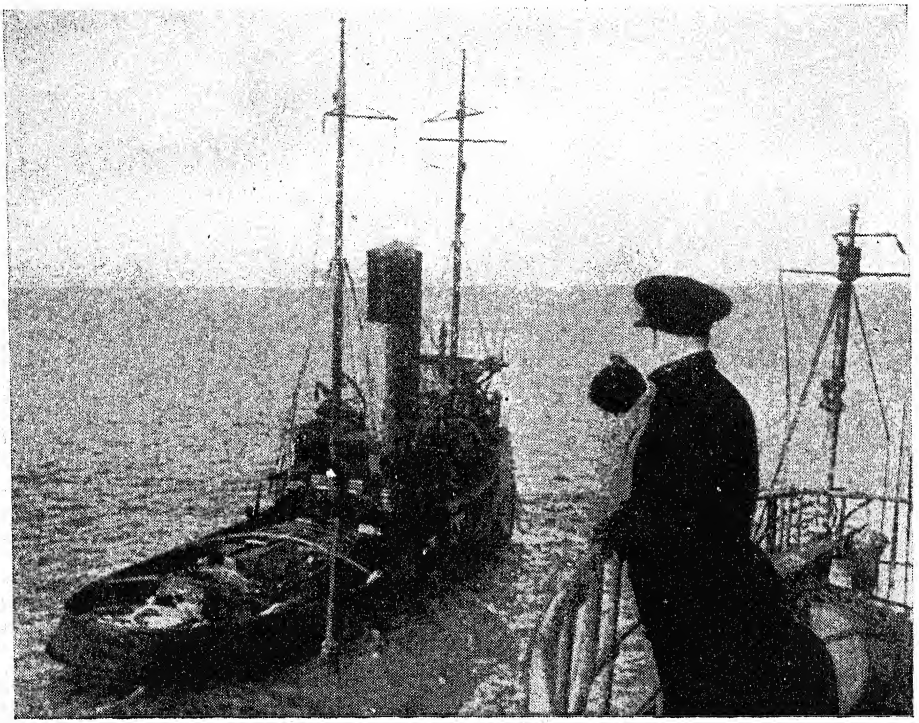
Fig. 13. *Paddle-steamers once travelled the oceans. Modern paddle-steamers were used for holiday traffic and for happy excursions on the Clyde and around the south coast, as well as to connect ports inaccessible—in estuaries—to rail and coach services. They maintain a high standard of comfort for passengers. Here is the Southern Railway steamer "Whippingham"*



ALL-WEATHER SHIPS OF THE FISHING FLEET

Figs. 14 and 15. *The trawler steams forward when at work—drifters (below) drift. Trawlers go far out to sea to find the deep water fish, dragging the net along the sea bottom to gather up the catch, and life on a trawler means hard and unremitting work for the crew. A strong ship of about 150 feet in length, in wartime the trawler is tremendously useful for mine sweeping and other duties. The stoutly-built little drifter, smaller in size than the trawler, is shown below, plunging in a heavy sea. Employed in the North Sea herring fishery, drifters use drift nets to catch the surface-swimming fish, mainly herring. Although steam vessels, drifters carry a steadying sail on the mizen mast to keep the ship's head to wind*





A TUG ON THE JOB

Fig. 16. *Tugs are invaluable little vessels, strength and seaworthiness their stock in trade. With their strong hawsers and towing gear they do wonderful work in salvaging damaged ships. This crippled ship has been taken in hand by tugs, and one of them is about to start pulling her into harbour for repair. Thames tugs are used exclusively for handling barges*

The trawler actually trawls (or tows) when fishing, her tow consisting of a large conical-shaped net, the mouth of which is kept open by two flat boards known as otter boards. Some of the largest trawlers are really ocean-going ships. They have plant for dealing with cod and other fish livers; they catch some of the choicest fish. In some cases, refrigerating machinery, such as we find in a fruit ship or meat ship, is fitted.

The trawler is a handsome little vessel, with raking stem, streamlined hull, tall funnel, tall bridgehouse and two masts. As will be seen from Fig. 14 she is unmistakable at sea, though she may sometimes be confused with a pilot cutter, the ship which cruises near a port entrance or harbour mouth to put pilots in incoming ships and pick them up from departing vessels.

The drifter (Fig. 15) is often a wooden ship. As her name indicates, she literally drifts when fishing, putting out a vertical wall of net in front of her, the net being as far as possible athwart the stream of herring. When the net is hauled in by the capstan, the gills of the fish are entwined in the net from which they are shaken free on the deck. They are then put down in the hold for the run home.

Never was the term harvest of the sea more correctly applied than to the herring industry, and to the ships which run it. You could stand on the quay at Great Yarmouth during the herring season in

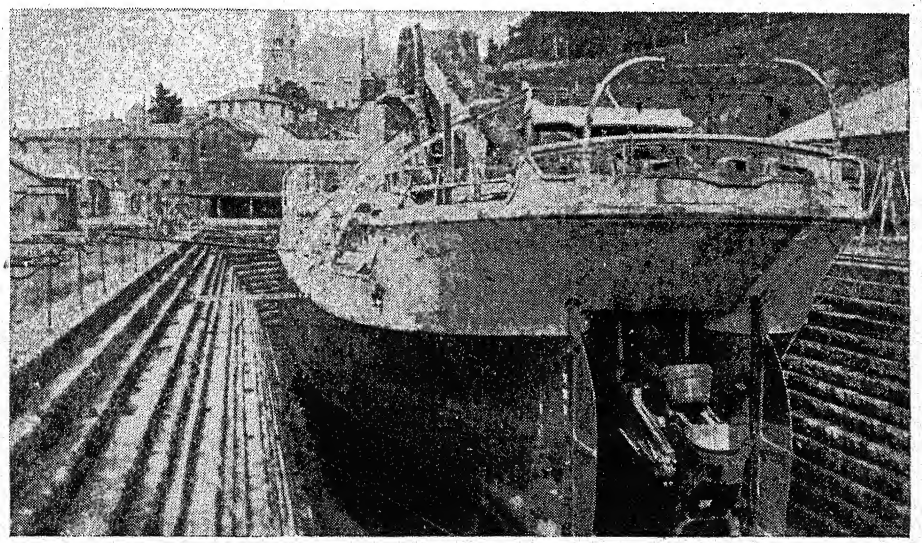
September, and watch thousands of shining fish being poured into baskets, which were then hoisted from ship to quayside.

In size, there is some similarity between the fishing vessel and the large ocean-going tug. When running out into the middle of the Atlantic to pick up a ship to be salvaged, the tug may have a speed of as much as seventeen knots. Her powerful pumps enable her to clear the water from a ship's hold. Her hawsers and towing gear are so strong that she can bring a 12,000-ton tanker across the Atlantic to the shipyard which will repair her. Such big tugs are not so numerous as the small and efficient little vessels which surround a big ship when she is docking. These are ship-handling tugs, and do not normally go far outside the harbour limit. There are even smaller tugs on the River Thames, exclusively for the handling of barges, an important feature in the work of the river. A typical tug is shown in Fig. 16.

Lastly, we come to a big, miscellaneous group of vessels. Some of them may be classed under the heading of "Subsidiary Transport," important in the sense that without their work no other transport could go on for long.

Take, for example, the dredger. Unless the entrance to big harbours are kept clear of sand or rock or mud, the draught of ships using the port would be limited, and hence the trade of the port would diminish. The bucket dredger (Fig. 17)—one of the most important—has an endless chain of buckets, worked by gear wheels from an engine in the hull. This digs the lip of each bucket into the sand or material to be dredged, brings it up to the top of the structure, and discharges it from each side of the structure either into the hull of the dredger itself or into little ships called hoppers on either side.

But where there are large quantities of sand, it is more profitable to use the type of dredger which is, in actual fact, a sand sucker. Such craft, very numerous in ports like Liverpool, Rotterdam, Hamburg in peace time, and in other ports



BUCKET DREDGER IN DOCK

Fig. 17. *The dredger's job is to keep the entrances to harbours clear of sand and mud. There are many types. The bucket dredger accomplishes its task by means of an endless chain of buckets which dig out the sand and discharge it into the dredger itself or overside into hoppers*

where there is considerable silting up, have powerful centrifugal pumps which are driven by enormous engines, capable of moving thousands of cubic feet of sand per hour.

Then there is another class of dredger which you find round the entrances to docks and locks. This is a grab dredger, which lifts coal out of trucks, and mud away from dock entrances.

Salvage ships are sometimes tugs, but tugs are not always salvage ships. Such vessels are fast, with powerful portable pumps and wrecking gear. This equipment enables them to stand by a ship which has run, say, on the rocks.

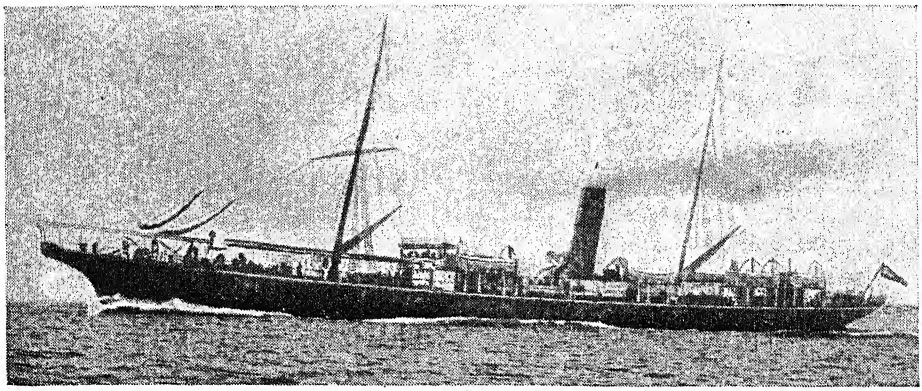
Cable-layers are among the most beautiful of ships afloat, because of the nature of their work. To pick up a broken cable over the bow and lay the mended cable over the stern, or indeed merely to lay a new cable over the stern, calls for a curving raked bow and a graceful yacht-like stern (Fig. 18).

Her hundreds of miles of cable are kept in holds, which form conical tanks, so that the cable is wound round and round the tank, every care being exercised to ensure that there are no kinks in the cable when it runs out. Fresh water is stored within the tanks proper. Sometimes cable ships work out in mid-ocean; on other occasions they are stationed near sturdy bluff red lightships marking a special channel or dangerous sandbank.

Finally, a word about ferries. They range from the rowing boat on the upper Thames to the large sleeping-car-train-carrier which in normal times runs between Dover and Dunkirk. The types have many features in common.

It will be obvious that if vehicles as well as passengers are carried, or vehicles only, they must have a flat deck considerably strengthened on the under side, a depth of hold not too great, a big beam or width in proportion to their deck, and plenty of engine power.

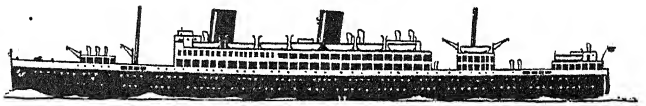
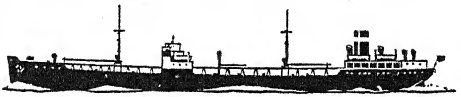
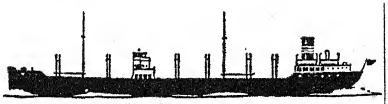
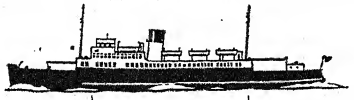
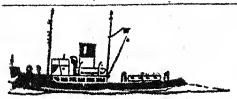
So shipping, it is apparent, is rapidly dividing itself into many distinct groups. Each has its particular work to do. Without a well-balanced Mercantile Marine, the people of the British Isles could not live in comfort in time of peace, enjoying to the full the fruits of the whole world, nor could they fight an enemy when war occurs. In the final issue of war, everything must depend on shipping.

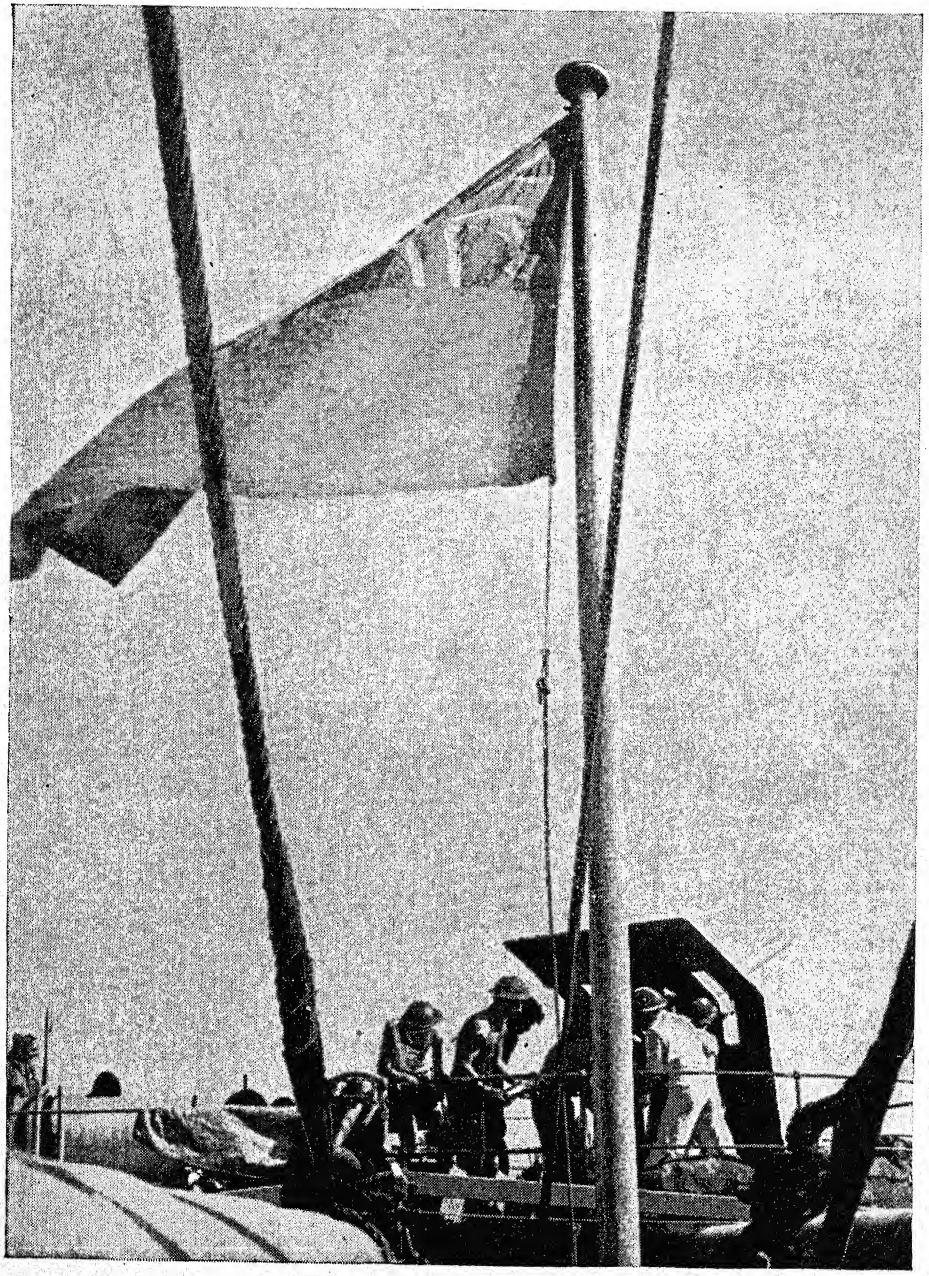


TYPICAL CABLE-LAYER

Fig. 18. *The cable ship has beautiful yacht-like lines because of the nature of her work—a broken cable can be easily picked up over the curving raked bow. Her hundreds of miles of cable are wound round conical tanks, which hold fresh water. She raises and repairs cables, in addition to laying them. Being at sea for long periods, she must have large fuel capacity*

THE SIZE AND CAPACITY OF MERCHANT SHIPS

An average ship type as below has a:	*Length of*	*When loaded floats in*	*Speed Loaded of*	*Tonnage of*	*Loading capacity of*
					
PASSENGER LINER	657·6 ft.	34 ft. 1½ in.	19 knots	17,350 gross	658,960 cub. ft. 517 pass.
					
CARGO LINER ...	516·3 ft.	29 ft. 7 in.	17 knots	12,320 gross	750,839 cub. ft. 12 pass.
					
OIL TANKER ...	462·8 ft.	27 ft. 0 in.	11 knots	8,012 gross	12,000 tons oil
					
TRAMP	414 ft.	25 ft. 3½ in.	11 knots	4,719 gross	585,420 cub. ft.
					
ORE CARRIER ...	387·1 ft.	24 ft. 4 in.	10 knots	5,787 gross	161,380 cub. ft.
					
CROSS-CHANNEL SHIP	353 ft.	15 ft. 1 in.	17½ knots	4,320 gross	725,755 cub. ft. 1,000 pass.
					
TUG (SALVAGE)...	198·3 ft.	17 ft. 11 in.	17 knots (without tow)	793 gross	No loading capacity: carries fire and salvage pumps
					
COASTER... ...	197 ft.	8 ft. 6 in.	9 knots	200 gross	62,480 cub. ft.
					
TRAWLER ...	134·6 ft.	11ft. 9in.	11 knots	180 gross	400,000 lb. fish



GUN DRILL ON A MERCHANT SHIP

Men of the Merchant Service have become gunners as well as seamen, for the ships which daily deliver vital supplies have constantly to meet enemy attack. Picture shows seamen gunners at drill under the Red Ensign. This is the distinctive flag of merchant ships. It has a Union Jack in the corner, and is affectionately known as the Old Red Duster

CHAPTER 4

Men of the Merchant Navy

Uniform. Shipping Act of 1854. Rank. The articles. The master. First mate. Boatswain and carpenter. Quartermasters. Seamen and boys. Engineers. Greasers, firemen and trimmers. The purser. Stewards. Merchant ships in the Royal Navy. Monotony of patrol duties. Fishing vessels and their crews. Mine sweeping. Allied merchant seamen

It is surprising how little is known by the general public of a nation of islanders about the men of their Merchant Navy. This may be because in peace time officers are rarely seen ashore, and the men of the deck, engine-room and stewards' department do not wear uniform. Unless you lived at a seaport, and close to the docks, you would never see them in their work-a-day clothes. Indeed, in my early days at sea it was an unwritten law that the master of the ship should don his top hat and frock coat before going ashore to hand in his report at the shipping office at the end of a voyage.

FIRST TRAINING SHIP

To understand fully the position of the British Mercantile Marine, it is necessary to learn a little about our naval history, for from time immemorial the two great sea Services of Supply and Defence have been interwoven in the strand of our national life. In medieval times there was no such thing as a fighting navy. There were certainly Royal Ships, but these were usually merchant ships engaged in trading to help fill the royal coffers, and were entirely a business transaction on the part of the monarch. When war did break out, the monarch called on as many merchant ships as were lying in harbours to come to his aid and fight for king and country.

It was not until the early part of the eighteenth century that the two sea services separated into the Merchant Navy and the Royal Navy. It was only then that the Royal Navy as a fighting force was established. Then it was that Parliament ordered all merchant ships to wear a distinctive flag. This flag was to be a Red Ensign, in the canton of which (that is to say, the top corner next to the flagstaff) was placed a small Union Jack. Today this is the flag which men of the Merchant Navy affectionately call the Old Red Duster. It is known the world over.

Soon after this, the Marine Society was formed, which meant much to our sailors, for it was the first organized attempt to train men for the profession. The Society provided uniform and kit for lads entering either the Royal or the Merchant Service. A ship named the *Beatty* was purchased for the training of these lads; she was the first training ship in the world. Anchored in the Thames between Deptford and Woolwich she did excellent work.

MERCHANT NAVY RECOGNIZED

Up to this time there was no uniform either in the Royal Navy or in the Merchant Service. George II, however, decided on blue and white as the distinctive colours for uniform for officers in the former service. It is said that one of his lady loves wore a pretty dress of these colours, which impressed the monarch. It was many years afterwards that the men of the lower deck were placed in uniform,

though certainly some wealthy captains used to rig their boat's crew in a livery of their own design, which they provided at their own cost.

But when the Shipping Act of 1854 was passed, embodying all previous legislation, merchant seamen were at once placed on a better footing. Furthermore, the Act regulated the method of engagement and discharge. Shipping offices were set up in the principal ports, and articles of agreement were drawn up between the owners and the crew.

The official log book was born, and the health of our seamen was given primary importance for the first time.

CONDITIONS IMPROVED

As the years passed, new shipping companies, which became leaders in the industry and were more interested in passengers than cargoes, came into the field, and soon the conditions for all on board such ships improved, to some extent, as the result of competition. These owners insisted on officers wearing distinguishing uniforms. In most cases the uniforms were fashioned on those in use in the Royal Navy, with alterations in badges and decorations.

It was the wealthy East India Company that introduced uniform for its officers. So good were conditions in this company's ships that many men preferred to serve in them, rather than in the King's Navy. This is how we got the term Merchant Service and King's Service. There is no standard uniform for officers in the Merchant Service today. They wear the uniform chosen by the company with which they serve, together with distinctions of rank which are recommended by the Board of Trade. The master usually wears four gold stripes which vary in design. Some masters like to wear plain circles round the sleeve of the coat, others have distinctive stripes on the coat shoulder. The first mate sports three, the second two, and other officers one stripe (Fig. 1). Caps carry a crown and anchor.

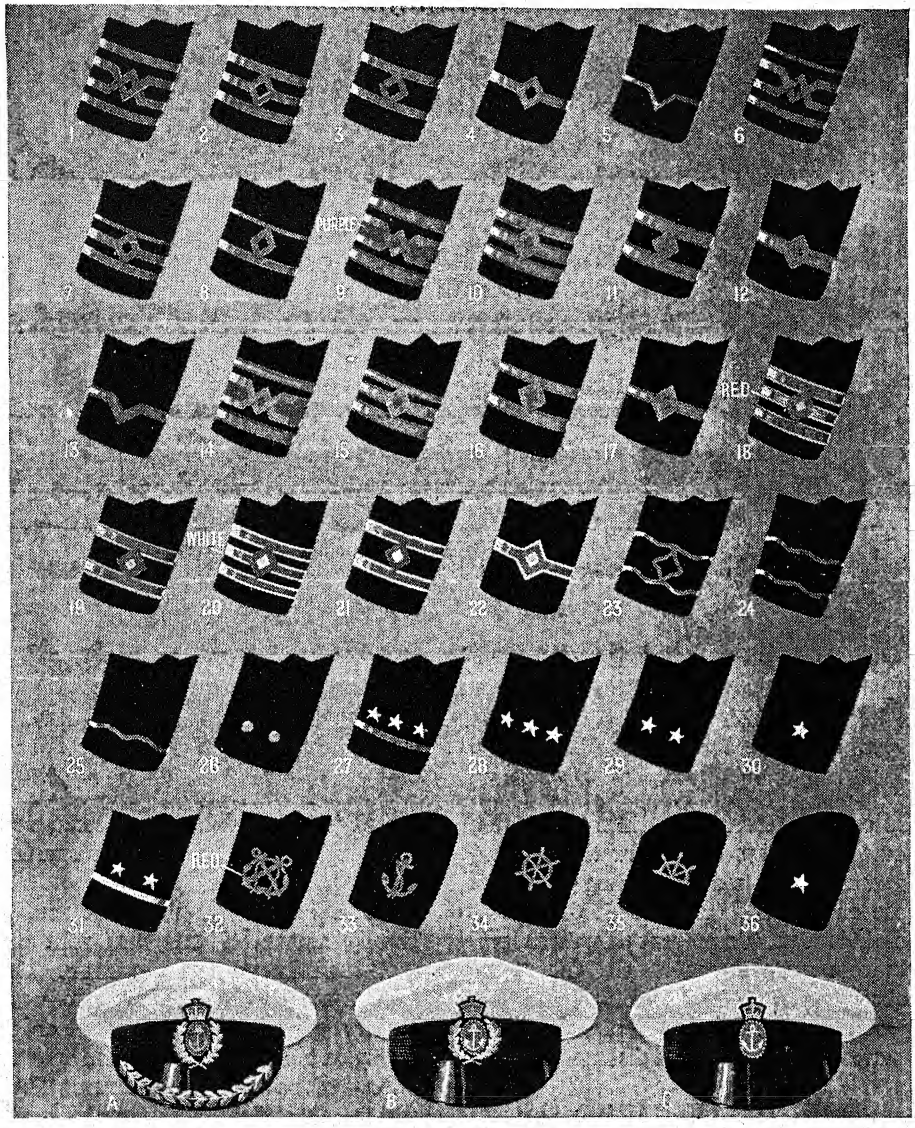
At one time there was a great deal of rivalry amongst the big shipping companies as to whose officers should be the most smartly dressed, and one line, which shall be nameless, tried to put their officers in uniform as nearly as possible like those worn in the Royal Navy. The story goes that the chairman of the company wrote to Whitehall requesting permission for their officers to wear epaulettes. A well-known admiral dictated the reply to the effect that permission would be granted—if the officers concerned would wear three! No suggestion was made in the letter as to where the third epaulette was to be worn.

Different departments are frequently distinguished by coloured cloth between the gold, as in the Navy. The deck department has no colour, just the blue of the cloth sleeve. Engineer officers show a purple band, pursers a white one, and doctors red. On the quartermaster's sleeve a steering-wheel is represented.

R.N.R. AND R.N.V.R.

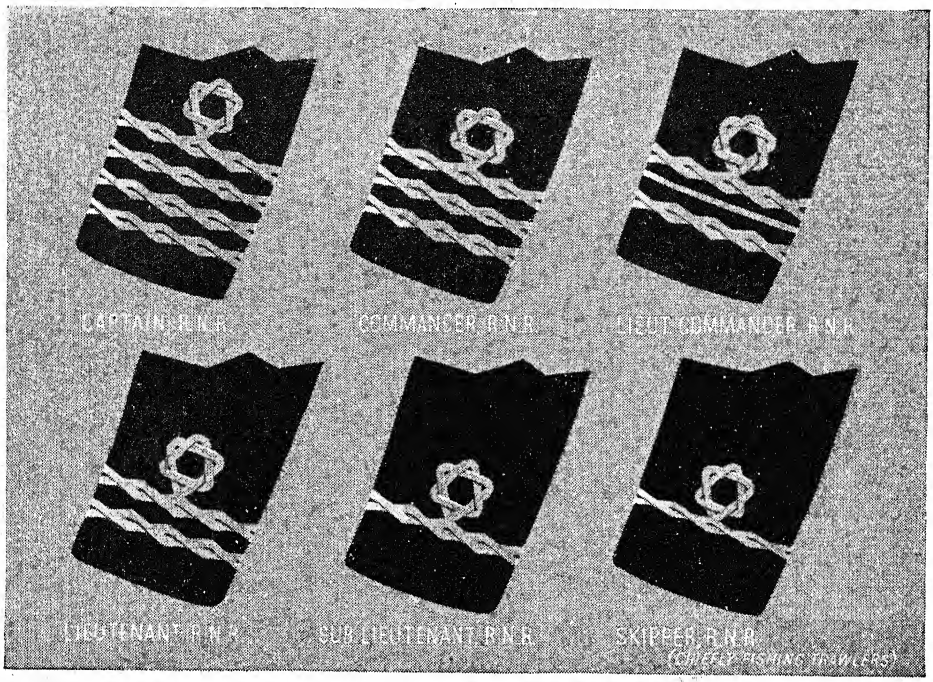
The badge of the Royal Naval Reserve officer is two thin gold bands plaited (Fig. 2). One thin band undulating round the coat sleeve signifies that the wearer is in the Royal Naval Volunteer Reserve (Fig. 3), known as the "Wavy Navy." The number of rings designates the rank. A captain has four, a commander three, a lieutenant-commander two and a half, a lieutenant two, while a sub-lieutenant sports only one. Warrant rank does not carry a gold band, but only buttons on the sleeve. This also is the distinguishing uniform of a midshipman. The three buttons on the sleeve have given rise to the name by which the midshipman is usually known—snotty.

In the dark winter nights, the bridge of a ship is not too comfortable, and a bitter east wind would cause the nose of a lad to



CAPS AND SLEEVE MARKINGS OF THE MERCHANT NAVY

Fig. 1. *The above markings are recommended for general use by the Board of Trade. 1, Master; 2, Chief Officer; 3, Second Officer; 4, Third Officer; 5, Uncertified Junior Officer; 6, Second Master; 7, First Officer; 8, Junior Second Officer; 9, Chief Engineer; 10, Second Engineer; 11, Third Engineer; 12, Fourth Engineer; 13, Uncertified Junior Engineer; 14, Second Chief Engineer; 15, Junior Second Engineer; 16, Junior Third Engineer; 17, Junior Fourth Engineer; 18, Surgeon; 19, Assistant Surgeon; 20, Senior Purser; 21, Purser; 22, Assistant Purser; 23, First Wireless Operator; 24, Second Wireless Operator; 25, Third Wireless Operator; 26, Cadet; 27, Chief Steward; 28, Assistant Chief Steward; 29, Steward; 30, Assistant Steward; 31, Steward (cargo ships); 32, Boatswain; 33, Boatswain's Mate; 34, Quartermaster; 35, Quartermaster's Mate; 36, Cook; A, Master's Cap; B, Officer's Cap; C, Petty Officer's Cap*



RANKS OF ROYAL NAVAL RESERVE

Fig. 2. *Many Merchant Navy officers volunteer in peace time for training in the R.N.R., which is the first line of reserve for the Royal Navy. The highest rank they can obtain in the Royal Navy is Commodore. The badge of R.N.R. officers is two gold bands plaited*

run somewhat freely. Apparently it was the custom in days of old for these young gentlemen to remove offending drips from the ends of their noses with the sleeves of their coats. To prevent this, three large buttons were placed on the sleeve, just above the wrist band, which it was hoped would render such a deplorable habit more difficult of accomplishment.

HOW THE CREWS SIGN ON

Nowadays, in peace time, the crew of a merchant ship is signed on articles before a shipping master at the port from which the ship is sailing. The crew attend the shipping office, as do the heads of the departments. The mate will see to men of the deck department, the second engineer will look after the men in the engine-room and stokehold; and the purser or chief steward is responsible for the stewards, cooks, and so on, necessary for running the victualling side of the ship.

The articles, or, as this document is officially known, T 124, are read out to all men intending to sign on. The tacit consent of the men is taken to mean that they agree to the clauses which are as binding on both parties—the men and the owners—as any legal document. Then every member of the crew signs his name to the agreement. Against his name are his rate of pay and occupation. The articles are opened by the master.

It may come as a surprise to some to learn that there is no such rank as captain in the Merchant Navy. The man who is often called captain is actually the master of the ship. In the early days of trade, the owner of the ship,

who was usually a merchant, was known as the captain, and he employed a navigator whose duty it was to navigate the ship from and to the various ports as instructed by him. This navigator was called the master of the ship.

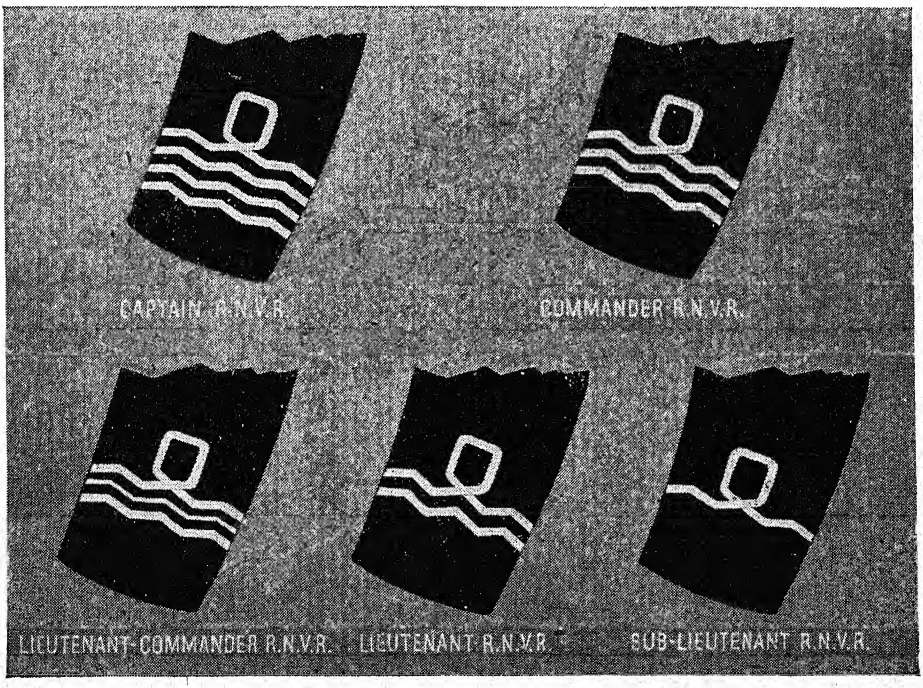
Neither are there any officers in the merchant service. The men who assist the master in the navigation of the ship are called mates. Thus the chief officer, next to the captain, would be the first mate on articles, the next the second mate, and so on. The officer titles given them today are entirely honorary.

The duties of the deck department are considerably less today than they were in the days of sail. Since mechanical propulsion has taken the place of the winds of heaven in driving ships across the waters, the engine-room staff has increased proportionately and the deck department has considerably decreased.

The master of the ship is responsible for the safety of all on board and although he may not take an active part in the navigation, nevertheless, it is his job to see that this is correctly done. Even when he has a skilled pilot on his bridge, his responsibility still remains; should the pilot run the ship ashore it is the master who must take the blame, as it is argued that he should be a better judge of pilots!

RESPONSIBILITIES OF THE MASTER

Think for a moment of what the master of a big liner has under his care. Apart from the lives of passengers and crew there is probably a valuable cargo and, added to this, the hull and fittings of his ship. In many cases the monetary value



DISTINCTIONS OF RANK IN R.N.V.R.

Fig. 3. *The undulating gold band is the mark of the R.N.V.R., the "Wavy Navy." Four rings mark a captain, three a commander, while a lieutenant-commander has two broad rings, with a thin ring between them. Two rings mark a lieutenant, and one a sub-lieutenant*

MASTER AND MATE

On the bridge of an oil tanker, master and mate admirably typify the merchant seamen engaged in the battle of the seas. The master (left) returned from retirement when the war started, after thirty years in ships. His second mate (right) has had fifty years at sea

is exceedingly high, yet the pay of these men is small compared with salaries ashore for posts of far less responsibility.

The first mate is usually known as the chief officer in passenger ships. In a way, he corresponds to the first lieutenant in a man-of-war. He is the executive officer, and it is up to him to see that cargo is properly stowed and discharged at the correct port. He has also to see to the general cleanliness of the ship. He does not often keep a watch; this is done by the other mates who, of course, help in the running and navigation of the ship.

The boatswain and carpenter come next in the deck staff. They have a crew of their own in large ships and come into line with men of warrant rank in the Royal Navy. The term boatswain is common to both services and is a very old word. Actually, it means the man in charge of the largest boat in the ship. In olden days it was customary for the captain-owner to travel in his ship.

OLD SHIP CUSTOMS

He was not a sailor, and when the ship reached port he would have to go ashore to conduct his business. Gangways were non-existent or very primitive, and it was difficult for a landsman to negotiate them, so the owner was lowered down to the waiting boat in a chair slung on a block and tackle. The crew would stand by on the end of the tackle and the boatswain would keep an eye on the descending chair, and signal to the crew to hold fast when the chair was close enough to the boat to allow the occupant to step out of it. On his return, the reverse action would take place to get the captain-owner inboard. The boatswain gave the signal with a whistle, which he wore suspended round his neck by a small silver chain. This whistle is the boatswain's pipe and this is the origin of the custom, when an important person joins or leaves a ship, of piping him over the side.

Quartermasters are next on the list. They are men who have had a good deal of sea-going experience and are able to take a turn at the wheel. Then come the able-bodied seamen, ordinary seamen, and boys. This is the deck part of a ship's complement today in liners and cargo liners. The principle is the same for other ships, but is naturally adjusted to suit tonnage and trade conditions.

WORK BELOW DECKS

The chief engineer is the head of the engine-room staff. On him falls the whole responsibility for the main and subsidiary machinery. Here again conditions call for slightly different personnel, but in the main he has a staff of juniors according to the size of the ship and her cargo. If she is carrying perishable goods, such as meat, fruit, dairy produce, etc., she will have refrigerator holds, and a special engineer is told off for this duty. Electrical engineers are carried in all big ships. In an ocean greyhound engaged on the Western Ocean trade, there will be as many as fifty engineer officers.

There are no stokers in the merchant service. The greasers are experienced firemen who assist the engineers in the smooth running of the machinery and keep an eye on the firemen and trimmers. Today many ships are oil fuelled and then there is no need for so many hands in the engine-room.

If coal is used, the firemen have the job of working in the stokehold to keep the fires burning underneath the boilers. In coal-fuelled ships, this is not an easy task and in the tropics these men suffer considerable inconvenience from the heat. Alongside each fireman is a heap of coal and it is no easy matter to throw a shovelful of coal into a furnace when the ship is rolling. It is the job of the trimmers to carry the coal from the bunkers to the stokehold. Also when the ship is coaling, trimmers have to be in the bunkers to see

that the incoming coal is evenly distributed, by no means an easy task.

In large passenger ships the purser's department is of the greatest importance. He will have as his assistant the chief steward and a personnel of anything between three or four hundred stewards. He is responsible for the entire victualling of the ship, and has many other duties.

PROBLEMS OF THE PURSER

Consider a large passenger ship starting on a voyage in peace time. She would have a crew of approximately 1,100, as well as 2,500 passengers of all classes, totalling something like 3,700 people—more than the population of many villages in Britain. It would be a big job to supply all these people with food daily even on shore with shops at hand, so think what it means to do this at sea.

Vast quantities of stores have to be carried in the holds and refrigerators and the amounts must be worked out almost to the fraction of a pound. Yet this work is efficiently carried out by the stewards' department in the ship. The chief steward may have as many as 150 cooks, butchers and bakers and a small army of stewards under him; the galleys have electrical devices to peel potatoes, cut beans, shell peas, stone raisins and wash dishes, etc.

Besides this, the purser has to act as host to the passengers, a position requiring a great deal of tact. People who are not used to shipboard life ask the most curious and inane questions—and a polite and satisfying answer must always be found.

"*And then there is the purser,*
Most polite and suave converser,
With a repertoire of anecdotes o'erflowing.
His one lifelong desire is
Just to answer such inquiries
As 'Please, purser, will you tell me where
I'm going?'"

In smaller ships such as cargo liners, a purser is not needed, and a chief steward combines the two jobs.

One of the duties of a purser is to make up the Portage Bill, which is a detailed account of the financial transactions of every member of the crew and the amounts due to each man when the ship pays off. When the crew is a large one, this necessitates a considerable amount of close clerical work, and the purser has in his office one or two assistant pursers. But when the crew is small, this job falls to the chief steward.

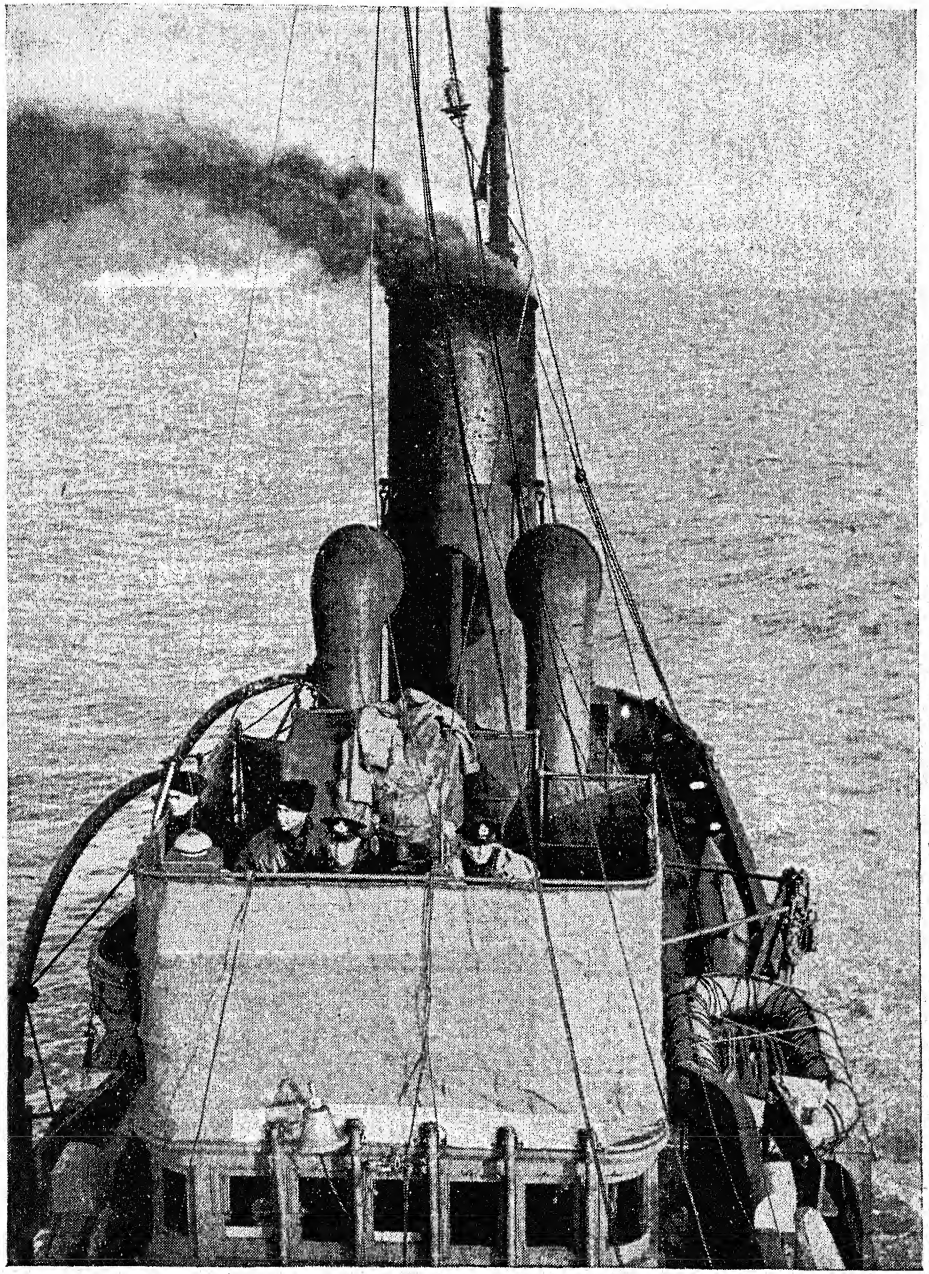
The crew of a tramp steamer is smaller than in passenger ships. Her deck department is much the same, as is the engine-room. She carries very few stewards, just a cook or two and a few stewards to act as personal servants to some of the officers.

The tanker, a special type of ship, is usually well found, with comfortable quarters and good food. On account of the inflammable nature of her cargo, there are certain restrictions on board which may become irksome, and by way of compensation extra food and comfort are provided. For this reason the tanker is popular among merchant seamen.

LINERS CHANGED TO WARSHIPS

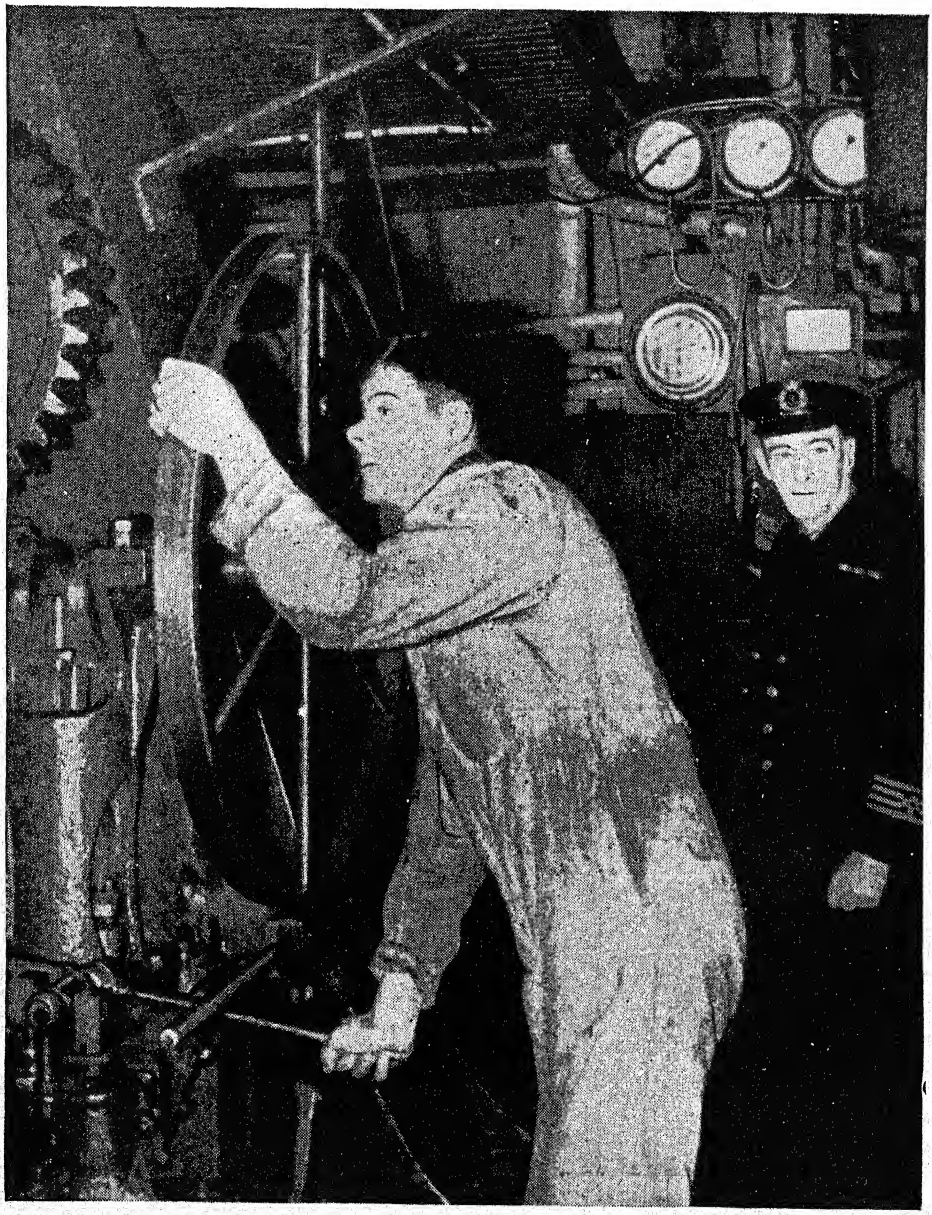
At the outbreak of war in 1939, many of our merchant ships of all types were requisitioned for the Royal Navy. The fast ocean-going liners were rushed into dock. All the trappings of passenger days were ruthlessly torn down and all inflammable material removed. Decks were stiffened to carry gun mountings and soon these ships, flying the White Ensign, were able to take their place as fighting auxiliaries of the Royal Navy.

A regular naval captain was appointed to the command of each of them, with naval gunnery officers. It was necessary also to appoint a signal officer and certain naval ratings. The original captain, if he were not already in the Naval Reserve, was given a temporary commission as commander and retained to advise the



SEARCHING FOR MINES

From the bridge of a minesweeper at work off the East Coast, keen eyes search the sea for enemy mines. Many trawlers are constantly employed in this dangerous job, sometimes retaining their old crews, and their skippers are given warrant rank in the Royal Naval Reserve



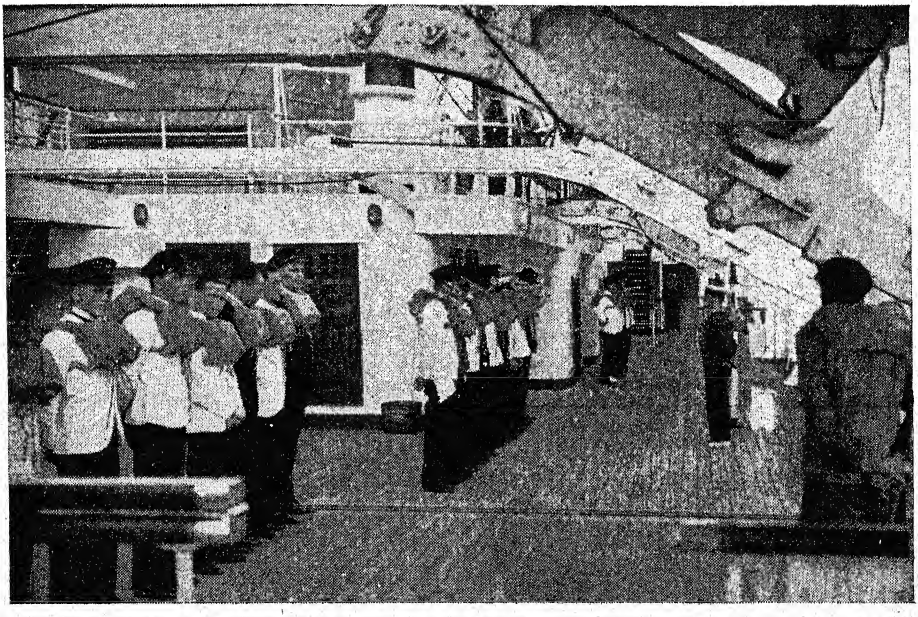
IN THE ENGINE-ROOM

The importance of the chief engineer's job cannot be over emphasized, especially in wartime. In emergency the safety of the ship may depend on his quickness and resource. He bears the whole responsibility for the main and subsidiary machinery of the ship, and is supreme in his kingdom below decks. This chief engineer (right), who has had forty years service on the sea, is shown in charge of the engine-room of an oil tanker. Tankers are popular with seamen, as extra comforts compensate for necessary restrictions due to the dangerous cargo

naval man. Nearly all the engineers were retained, as the extra strain on the engines demands the skill and knowledge of men used to working them. These officers were also given temporary commissions commensurate with their standing in peace time. In many cases, the men in the ship were in the Royal Fleet Reserve or Royal Naval Reserve, so they were accustomed to naval routine and speedily adapted themselves. Naturally the men from the Merchant Service found the work different, but all of them were proud of their uniform and a chance to serve their king and country in the Royal Navy.

In the ship in which I served in the first World War, we carried a naval captain, a commander R.N.R., a lieutenant-commander R.N., and seven or eight lieutenants R.N.R. who were in the ship when she was taken over. Two doctors were signed on and an extra paymaster. On the lower deck were several petty officers and ratings from the Royal Navy, and the remainder were made up of the merchant seamen already serving in the ship. When it came to the matter of signals, few merchant seamen were experts, and men from the R.N.V.R. took over these duties.

The great weakness in converting passenger ships into warships is the question of protective armour plating. A certain amount is placed round the guns for the protection of the gun's crew, but the hull of these ships is very vulnerable—a fraction of an inch thick. This was demonstrated in the second World War. The gallant *Rawalpindi* had no chance whatever against the formidable *Deutschland*, nor had the *Jervis Bay* against overwhelming odds. Both these ships had been converted into merchant cruisers (Fig. 4). The stories of their heroic encounters with the enemy thrilled the world.

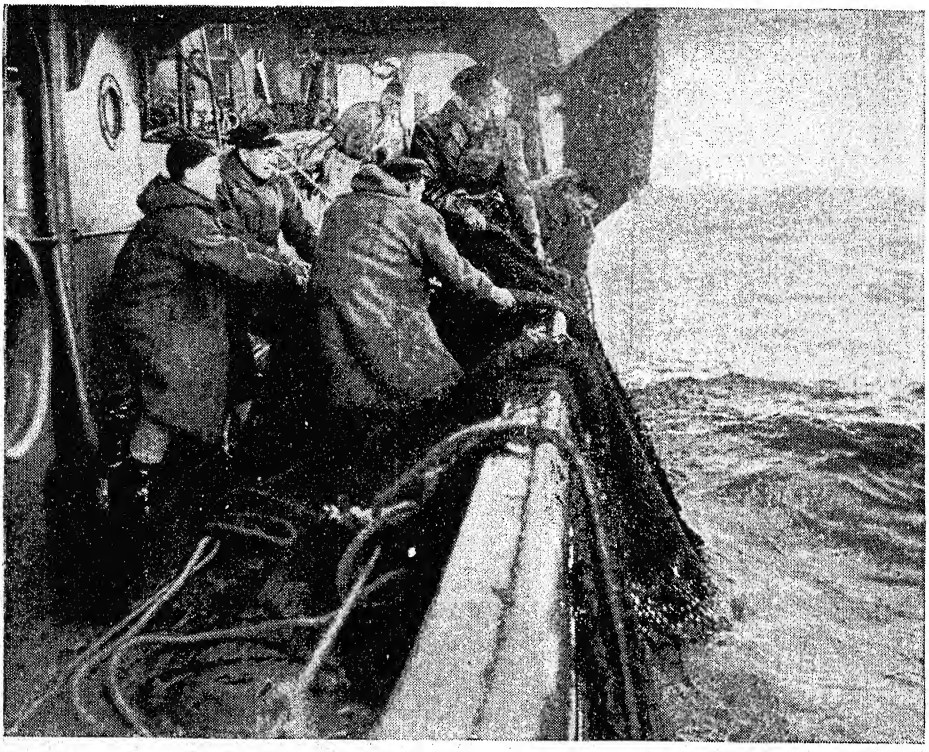


STEWARDS AT LIFEBOAT DRILL

The purser is responsible for the entire victualling of a large passenger ship. The chief steward and more than three hundred stewards assist him in seeing to the comfort of the passengers. A big liner will have 2,500 passengers to look after. Stewards are seen at lifeboat drill

Some of these converted ships are employed on patrol work. This is one of the most monotonous jobs, and its very monotony may become a danger. Daily alterations must be made on the routes taken, because, if the work fell into a matter of mere routine, the enemy would soon become informed of that fact. He would then only have to watch for a favourable opportunity to break through.

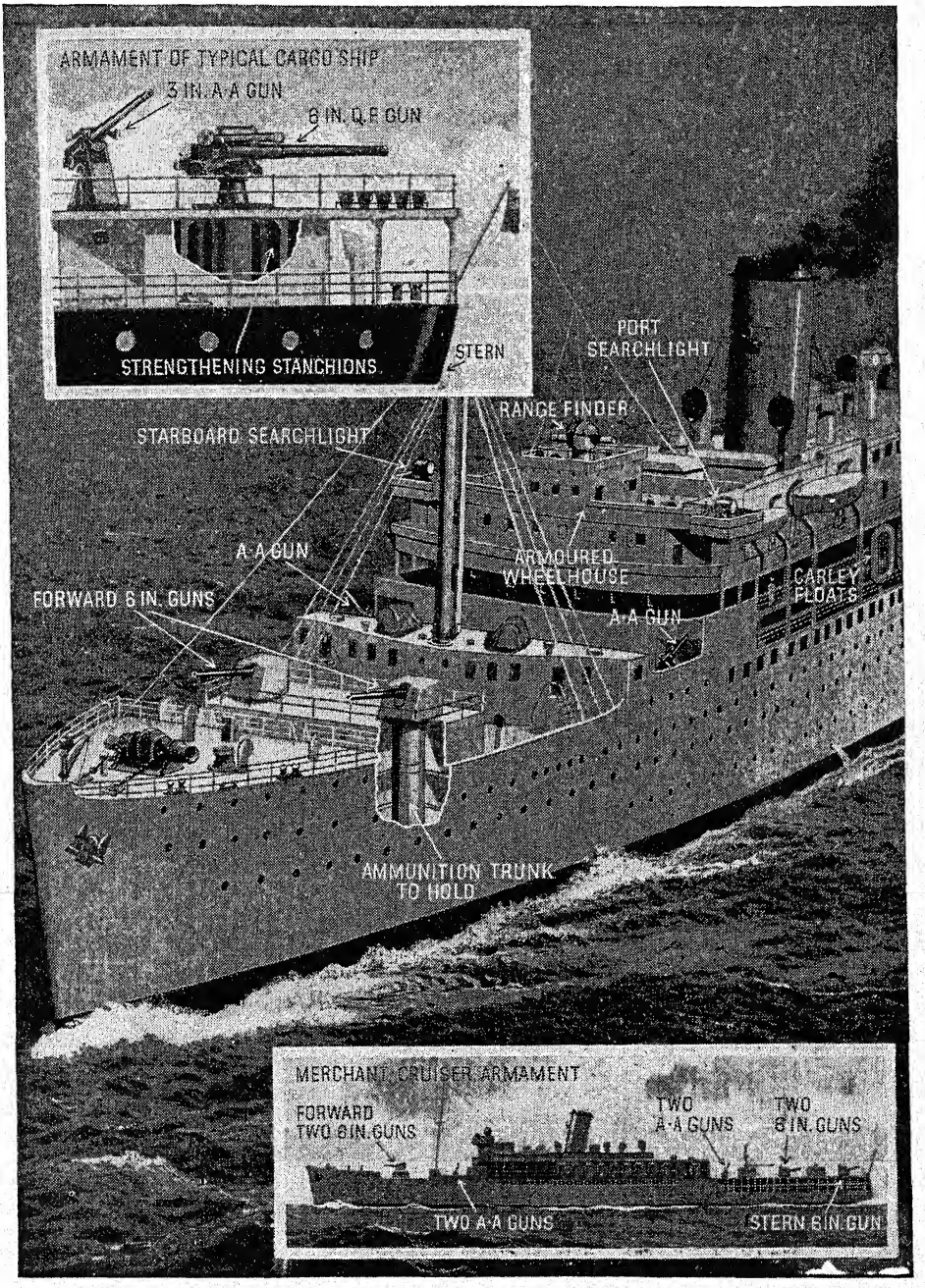
There are no finer ships sailing the seas than the trawlers which harvest our fish. They can be seen at work round our coasts, and are easily recognizable by two queer contraptions aft. These are called gallows and are on each side of the hull. It is through these that the wires pass to the great net which is trawled astern. Another feature of these trawlers is the otter boards. These consist of two right-angle planes of wood which are attached to the trawl wires when trawling is in progress, in order to keep the mouth of the huge net open. Many trawlers are now minesweepers, and do grand work.



PULL ALL TOGETHER, BOYS!

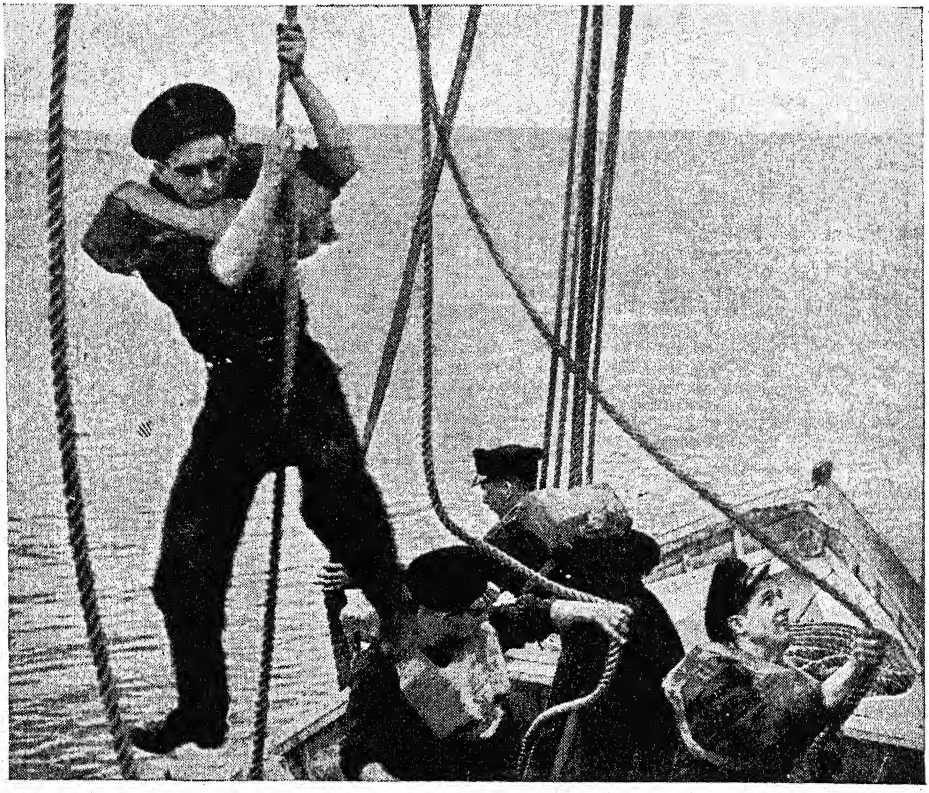
In off-duty spells, while not actually engaged on a sweep, minesweeper crews welcome the opportunity to do a little fishing for the ship's company, and a good catch often rewards their efforts. This picture, taken with a mine sweeping flotilla in the North Sea, shows the nets being hauled in after a successful trawl. In the background the cook waits expectantly

The master of such a vessel signs on T 124 and is generally known as skipper. He has a mate and six or seven deck hands in his department. The engines are in the charge of the first and second enginemen and there are two or three firemen, according to the size of the ship. The average size of a trawler is about 120 feet long, but she is pretty broad in



LINER CHANGED TO CRUISER

Fig. 4. *Many famous liners have been converted into armed merchant cruisers. Drawing shows a typical example, with details of her armament. Top, the armament of a cargo ship*



LOWERING AND MANNING THE LIFEBOAT

On H.M.S. "Gordon," one of the Navy's dry land "ships" which trains men for the Merchant Navy, men are taught everything about seamanship. They pass from instructor to instructor learning how to steer a ship and read a compass, how to stow cargo, how to knot and splice, how to shoot, and how to take soundings. Here they are learning to lower and man a lifeboat

the beam to enable her to withstand the fierce buffeting of the North Sea in winter. I served in such ships as these during the first World War and was really astonished at their seaworthiness.

Some of the larger trawlers are at sea for as long as a week on end, and are frequently to be seen engaged in trawling as far away as the stretch of water between Iceland and Norway. A smaller type of fishing craft is the drifter. She is usually seen near our shores and, as her name implies, she handles a drift net which is much lighter than a trawl. She is a wonderful boat for all weathers.

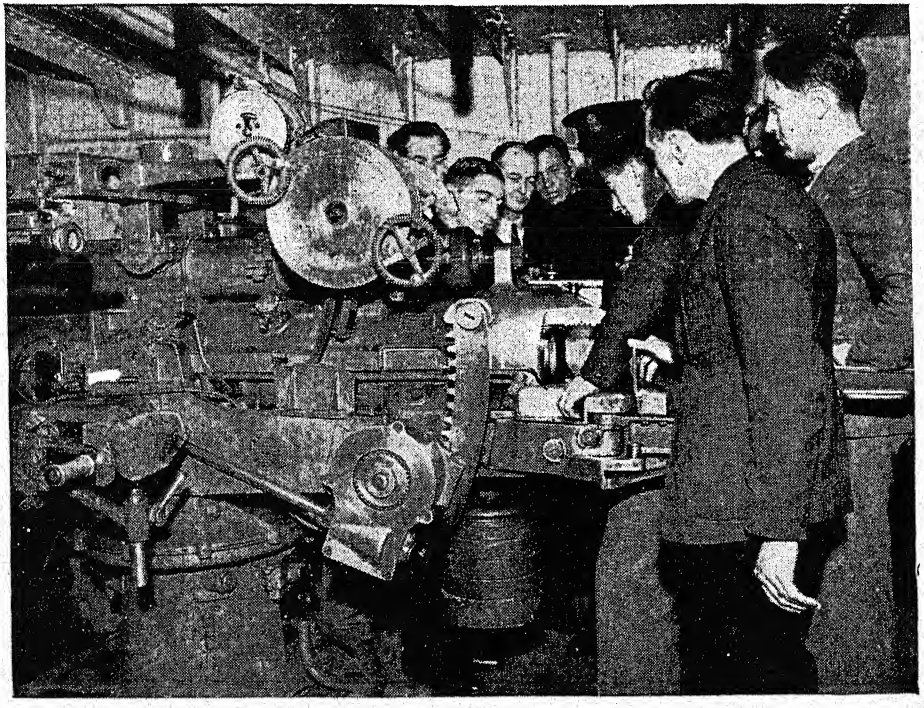
A large number of trawlers were requisitioned at the outbreak of hostilities in the autumn of 1939 because they can be so admirably adapted for war work; the larger vessels for patrol duties, and the smaller ones in the dangerous and hazardous work of mine sweeping. The gallows that used to handle the huge trawl took the sweep wires, and the otter boards kept this wire at the necessary depth to catch the mooring of hidden mines. The crew remained the same as in the peaceful days of fishing, with the addition of a naval petty officer for signal duties. The skipper was given warrant rank in the Royal Naval

Reserve and wore the peak cap and reefer jacket of this rank. Some of the fishermen were naval reservists and had had a certain amount of training in the Lewis gun and the twelve-pounder. Little knowledge have these fishermen of mines and submarines, but they set out with a quiet deliberation and as simple a demeanour as if they were off to shoot the trawl for the earning of their daily bread.

IN THE FRONT LINE

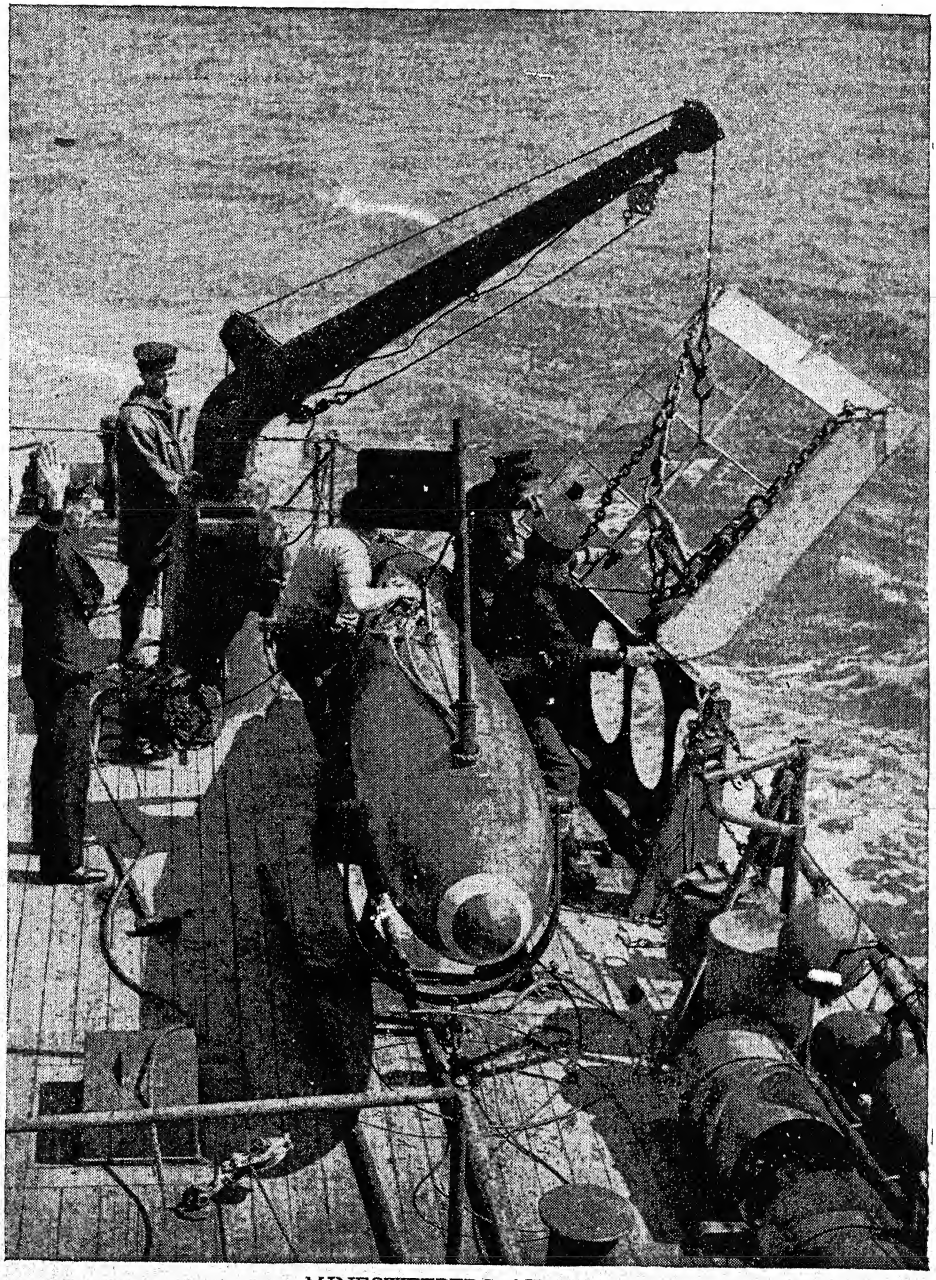
Some day the full story of the courage and endurance and skill of British merchant seamen and fishermen in the war will be written, and the nation will realize that these men were in the front line of the most important of all the battles which were fought in various parts of the world. For if they were to fail, nothing could save the cause of the United Nations. The Battle of the Seas is decisive, for the sea controls the land; every international war has been won by sea and the army of the victors has then done "the mopping up." In that task aircraft, which are of such value to both the Navy of Defence and of Supply, take their part.

And when tribute is paid to British merchant seamen, it would be ungenerous if praise were not also given to the seamen of Norway, Holland, Denmark, Fighting France, Poland and Greece, as well as to the seamen of the Dominions. Their ready co-operation with the British seamen in fighting the Battle of the Seas—and their unflinching bravery—is one of the great surprises for the Axis Powers.



LEARNING THEIR NEW TRADE

Men of the Merchant Navy are given special courses by Royal Navy instructors in gunnery, plane recognition, the use of depth charges, etc. Here young seamen are learning the mechanism of a 4-inch gun. Navigation and all branches of seamanship are taught at special schools



MINESWEEPERS AT WORK

Fig. 1. *The approaches to all harbours are regularly swept by a great fleet of minesweepers of all types. The work of the minesweepers never stops. It goes on night and day, and has saved numbers of ships from being blown up or seriously damaged. Here the sweeping apparatus is being lowered into the sea by a crane. Many trawlers have been adapted for use as minesweepers*

CHAPTER 5

The Merchant Navy in Wartime

A ship puts to sea in peace time. Many changes with the coming of war. Sailing under orders. Routine of entering harbour. Outer and inner defences. The boarding officer. Ministry of War Transport. Director of Merchant Ship Repairs. Seamen's pool. Arming of merchant ships. Dangers encountered by ships. Magnetic mines. Degaussing. Compass adjustments. The acoustic mine. Catapulting of fighter aircraft. Preparations for the next voyage. Convoy conference. Back to sea again

CAPTAIN JOHN SMITH walks down the steps to the street, and stops to draw a deep breath of relief.

He is always rather relieved to escape from shipping offices. They give him a feeling of oppression; for Captain John Smith, of London, or Newcastle, or Leith, or Aberdeen, or Glasgow, or Liverpool, or Cardiff, or Bristol, or Plymouth, or wherever else in the British Isles he hails from, is a bluff, hard-headed, forthright fellow, and, for the life of him, he can't see what all these people—men and women, boys and girls—in the shipping offices do with themselves all day long.

OUT OF HIS ELEMENT

People rushing this way and that, doors banging, telephones shrilling and squawking, pencils scribbling, pens scraping, typewriters clicking—yet always plenty of time to ease down and have a comfortable yarn with Captain John Smith, over a cigar and the business that brings him there. Office life puzzles Captain Smith.

He likes the cigar and the yarn; but just the same he is glad to get out into the open again, with all his papers crammed into the battered old brief case under his arm, or the still more battered attaché case that looks so incongruous dangling from one great paw. It swings as he walks.

He has squared up everything now—customs clearance, manifests, ship's articles—everything. His crew is complete, cargo stowed and hatches battened down under the efficient and watchful eye of the mate, he is complete with bunkers for the voyage, and drinking water, and boiler water, and stores—everything.

GOING ABOARD

For weeks or months he will be independent of the shore; his ship will become a little, compact microcosm moving on the great waters; and he, John Smith, will be master—" under God," as they say in the insurance policies—of that small self-contained world.

In his tweed coat and soft felt hat, looking as little like a seafarer as he can contrive, for he would never dream of wearing his uniform ashore, he sets off for the docks; walking deliberately, setting each foot down in front of him with emphasis, firmly, as he has learned to do in thirty or forty years of making his way along the steel deck or the wooden bridge of a vessel seldom steady under his feet. And you could not possibly mistake him for anything but what he is.

The dock policemen salute him, recognizing him on sight. He goes on board his ship, battered tramp or sombre looking,

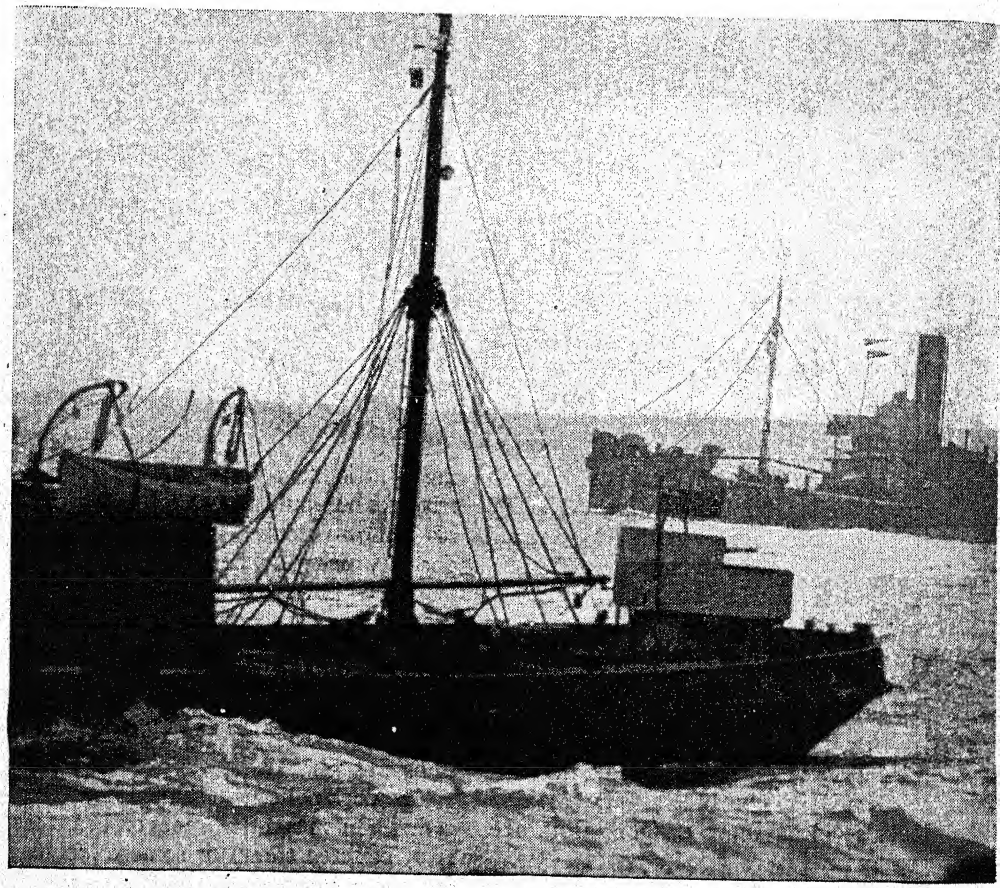
black hulled cargo liner, her name in small metal letters on the bows, *British Freighter*, and painted on her counter, with her port of registry underneath. He goes straight to his cabin, and is busy there for a short time, before the mate appears, to report.

The pilot is on board, the dock master has been warned, the ship is at immediate notice for steam, and the chief engineer is standing by. Everything is set.

FULL AHEAD!

Captain John Smith takes the bridge. The mate goes forward to the forecastle head, the second mate to the poop, the third mate (if there is a third mate) joins the master on the bridge. The engine-room telegraph drags, its bell trills, and is answered from down below; a whistle blows, a winch hisses and clanks and warps are eased. The screw thumps lazily, greenish water suddenly swirls along the hull, disturbing the scum that floats on the surface of the still, unruffled dock, the ship trembles a little, and begins to glide away from the quay wall.

She swings, deliberately. The pilot, the master, and the third mate peer down over the side, judging distances, watching, waiting. Mate and second are alert, ready to spring into action when the signals come from the bridge. The ship edges out, swings slowly round, slips out through



the narrow dock entrance, and enters the wider yet still confined waters of the river.

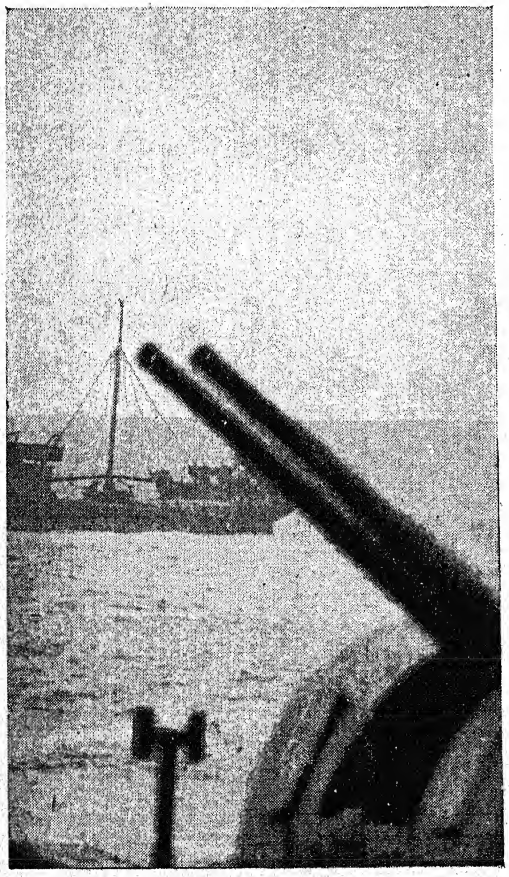
Half ahead now, with a sharp lookout; and she slides smoothly down river, making her way quietly, without commotion, through the busy traffic—fussing tugboats, impatient, hurrying ferry boats, red-sailed deeply laden barges, stolid, slow-moving lighters and puffers, swift sleek river steamers — all the multifarious thronging traffic of a great artery of trade.

The river widens, the land recedes, open sea lies ahead. The pilot is dropped. The master's hand goes to the telegraph: Full ahead!

The *British Freighter* is at sea. For days, for weeks, she will thrust her steadfast, stolid way over the limitless grey desert of sea, towards a horizon that steadily recedes as she steadily advances; and now Captain John Smith, master—" under God "—of the steamship *British Freighter*, is indeed master. He is back at his job.

His word is law. The ship is his. He is beyond interference, beyond any questioning of his authority. Even if his owners choose to alter his orders, he still remains master, and final arbiter of the ship's fate. He will obey the new orders only if he considers that the safety of his ship and her cargo is not jeopardized thereby.

The courses he steers, the speed he calls for, even, in emergency, the port he makes for—these are matters for his decision alone; for his is the sole responsibility, and he has been trained, through years of sea service, to accept that responsibility, which he willingly shoulders, to make his decisions for himself, and to command.



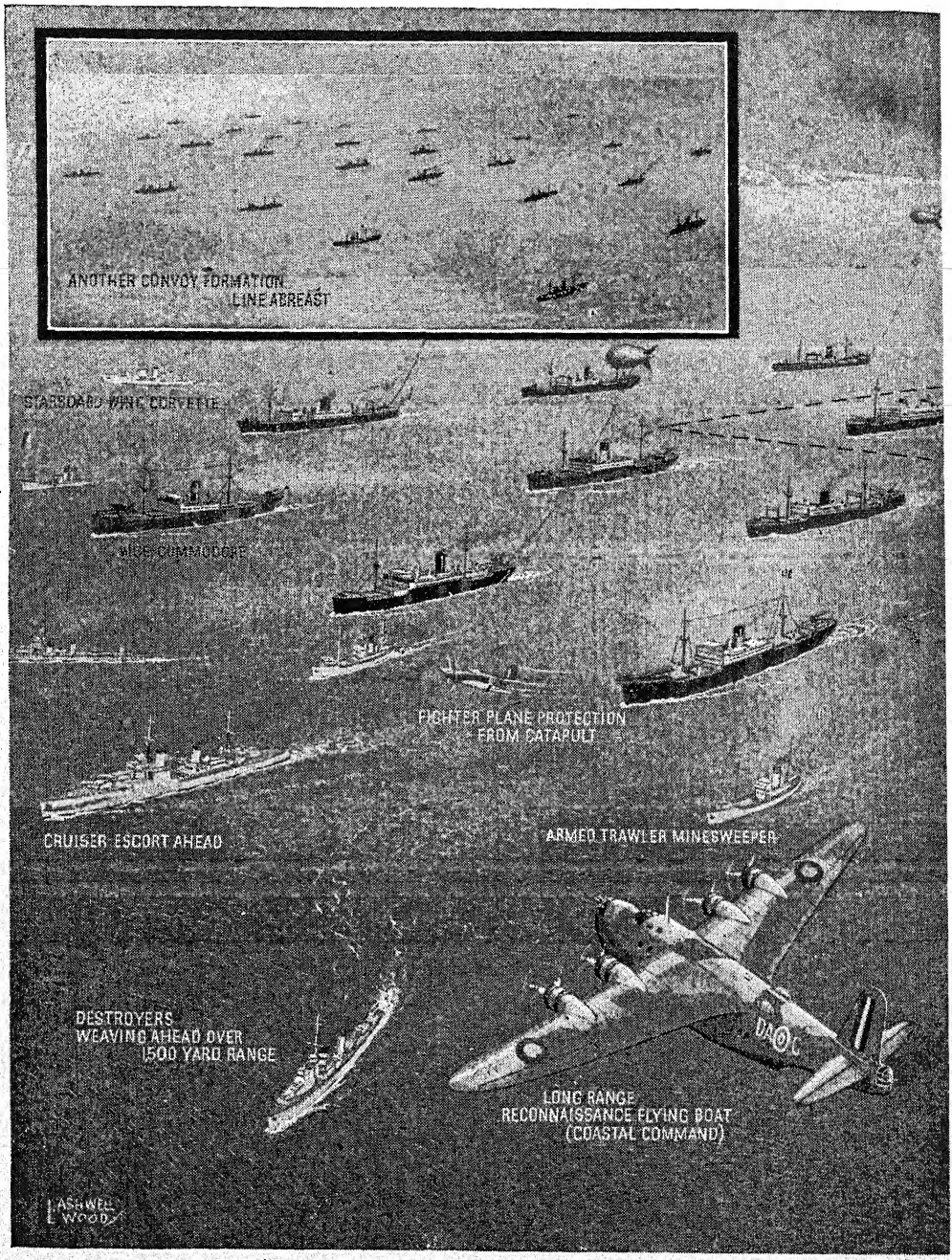
SHIPS IN CONVOY

An impressive view of ships sailing in convoy. The convoy system has been perfected by experience to give our merchant ships, themselves well armed, the greatest protection against enemy torpedoes and bombs. Convoys are escorted by destroyers or corvettes upon part of their journey

SEALED ORDERS

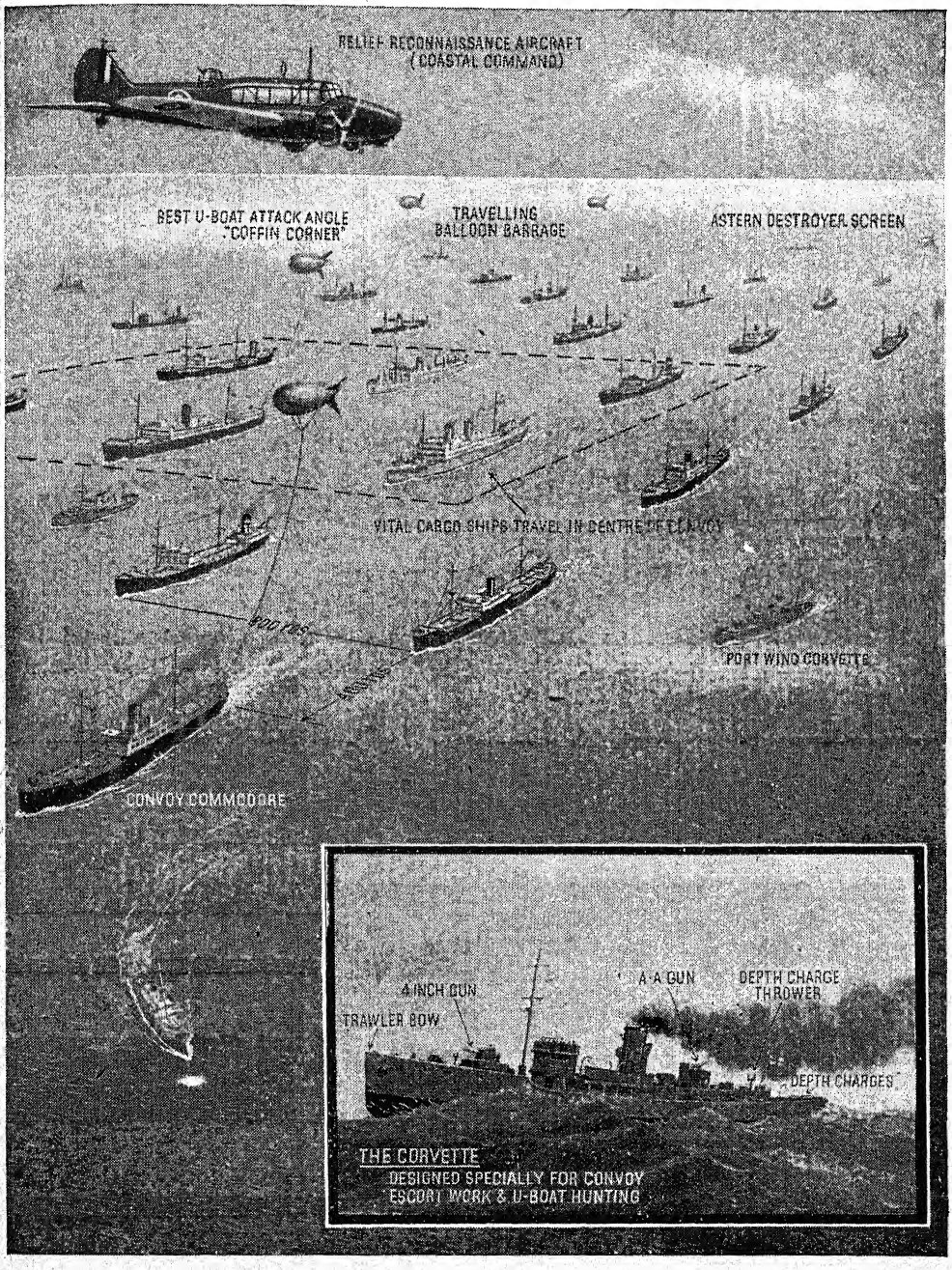
September 3, 1939—a curt wireless message in code—and Captain John Smith knows that it has come at last. Britain is at war with Germany. He is not taken by surprise. Already, in the past year, he has been amply warned; preparations have been made. His officers have been ashore to attend short, intensive courses in gunnery and in other matters essential to the safety of their ship at sea in wartime. At his last port of call, he received certain instructions—a packet of sealed orders to meet this eventuality.

So now, quietly, he goes to his office and opens these orders. He is to proceed to the nearest of a list of British ports,



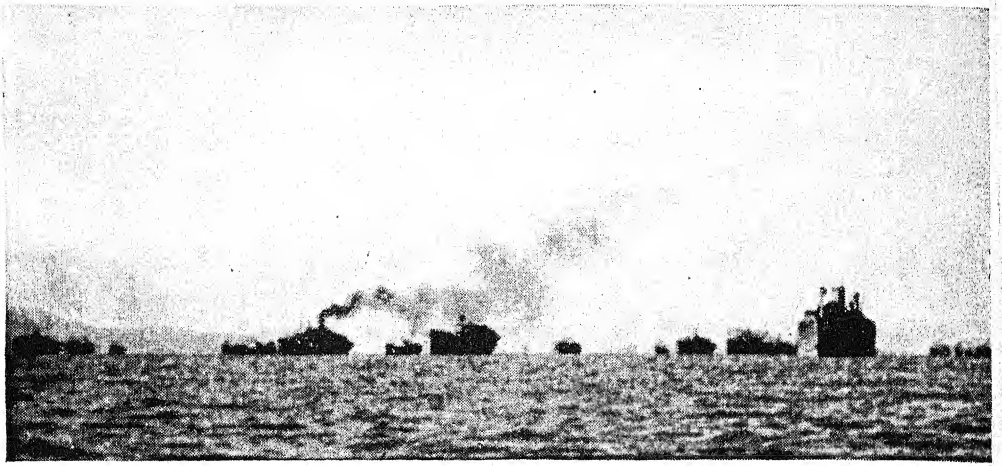
CRUISERS, PLANES, CORVETTES, MINESWEEPERS,

This drawing shows the measures taken for a convoy's protection. Cruiser escort is ahead and minesweepers patrol. Ahead and astern, destroyers search for submarines. Port and



GUARD ONE OF BRITAIN'S VITAL CONVOYS

starboard, corvettes on the alert, and coastal command aircraft keep watch. Vital cargo ships travel in centre of convoy. Inset (left) another convoy formation ; (right) details of a corvette



MERCHANT SHIPS OF BRITAIN STEAM OUT TO SEA ON THEIR LAWFUL
There is a sense of excitement and pride in this vigorous picture of a convoy in progress. The convoys sail almost daily, their crews unconcerned about the hazards they must face on every voyage from bomb, torpedo, and mine. The disposition of merchant ships in convoy is carefully planned to give the smallest target for lurking submarines. For further protection

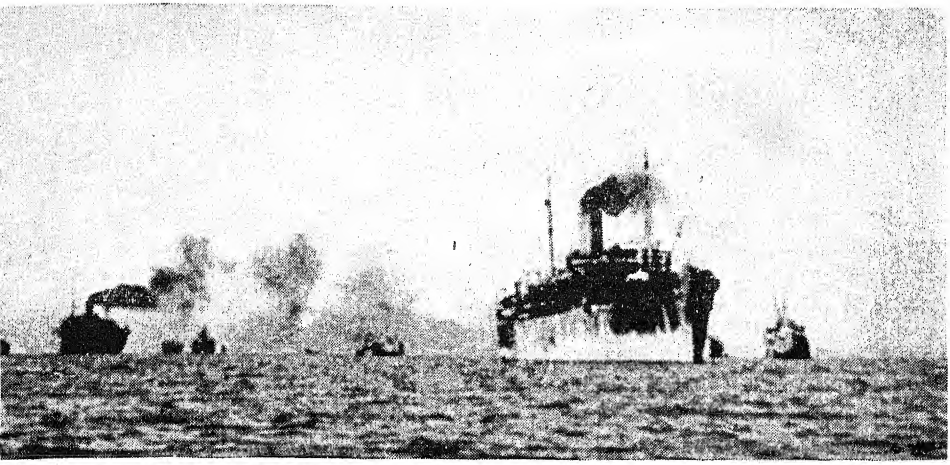
report himself to the naval authorities, and there await further orders. He is to adopt at once certain measures of defence and certain evasive procedure; he is to mount forthwith a special anti-submarine and anti-aircraft lookout, day and night; and he is to use his best speed to reach safety. There are other instructions.

PART OF THE WAR MACHINE

He obeys without hesitation. He issues orders, he studies charts, he makes calculations; and he realizes he is still master of the steamship *British Freighter*, his word is still absolute law; but he is no longer his own master. His owners, even, have become a secondary consideration. His ship is no longer a peaceful argosy of trade, earning dividends for a group of shareholders and incidentally a livelihood for himself and his crew and for scores of people ashore—shipowners, agents and their staffs, ship chandlers, shipyards, custom officials, insurance brokers, and the rest. Instead, she is an integral part of a vast and complex war machine; and as such she is under orders all the time.

Henceforth Captain John Smith is under orders. He can no longer sail when he pleases, lay his own courses as he likes, steam at whatever speed he thinks fit, bunker where he pleases, and use his own discretion to earn dividends for the shareholders. He is under orders. His comings and goings will henceforth be controlled; he may even be taken out of his ship and put into another without being consulted; his officers and crew may be changed; and every moment of his waking life, afloat or ashore, he will be conscious of this immense change.

It may be that at first he will find it irksome. But very soon he understands just how important his ship and himself are in the struggle into which they have been plunged; and he becomes acquainted gradually with the enormous organization that has sprung into being with one sole object—to get his ship to sea as quickly as possible, to get her across the seas as safely as possible, and to get her back home laden to the Plimsoll line with the thousand and one commodities that have become overnight the sinews of war—the raw materials,



OCCASIONS: ANOTHER CONVOY SAILS WITH ESSENTIAL SUPPLIES
against torpedo attack, the whole convoy frequently makes abrupt changes in course, zigzagging on patterns previously arranged. Destroyers and corvettes flank the convoy on both sides, and destroyers steam ahead. At night, when submarines can attack on the surface, and in narrow waters, the disposition of the convoy is completely changed

the oil, the aeroplanes and tanks and guns and shells, and above all, foremost of all, the food for Britain's millions which he carried in such vast quantities in peace time, and which Britain's millions, in peace time, seemed to take so completely for granted.

We are going to watch Captain John Smith and the *British Freighter* in war; and we cannot do better than follow him home to a British port, keep him company there while he discharges his cargo and loads again, and accompany him back out across the Western Ocean.

Of course the organization was not built up and perfected in a night. Of course it must be flexible, it must grow, day by day and week by week; and the weeks pass into months, and the months into years while the process goes on, until now it is complete, fully equipped, fully manned, and running smoothly. But it remains flexible, and can adapt itself swiftly to changing conditions—for, of course, conditions change, almost week by week, and measures that were sufficient to secure his safety a short time ago have been made obsolete by some new device, some new technique of the enemy's relentless and unceasing attack. Counter measures must be taken.

So we shall see Captain John Smith bringing his ship in to port after crossing the Western Ocean, and we shall stand beside him while he interviews this officer and that; and we shall begin to understand just how much he owes to those men who can be seen in every seaport in the British Isles, and in every British seaport abroad —naval officers, many of them elderly, Most of them will be retired or temporary officers of the Royal Naval Reserve, or the Royal Naval Volunteer Reserve.

ALTERING COURSE

Also how much we owe to Captain John Smith, that bluff, hard-headed, stout-hearted fellow who gets on with his job—just as the officers ashore get on with theirs —quietly, efficiently, and as a matter of course.

The *British Freighter* has made her landfall. The long, hazardous voyage across the Western Ocean is over, she is within sight now of safety. Captain John

Smith studies the instructions given him for the approach to his destination—the courses to be steered, the identification flags to be hoisted, the regulations to be obeyed.

He reaches the first given position, and there alters course. He is entering the swept channel—a wide channel searched diligently by the minesweepers, little sturdy vessels, which patrol the seas in all weathers, to ensure that ships may enter port in safety (Fig. 1).

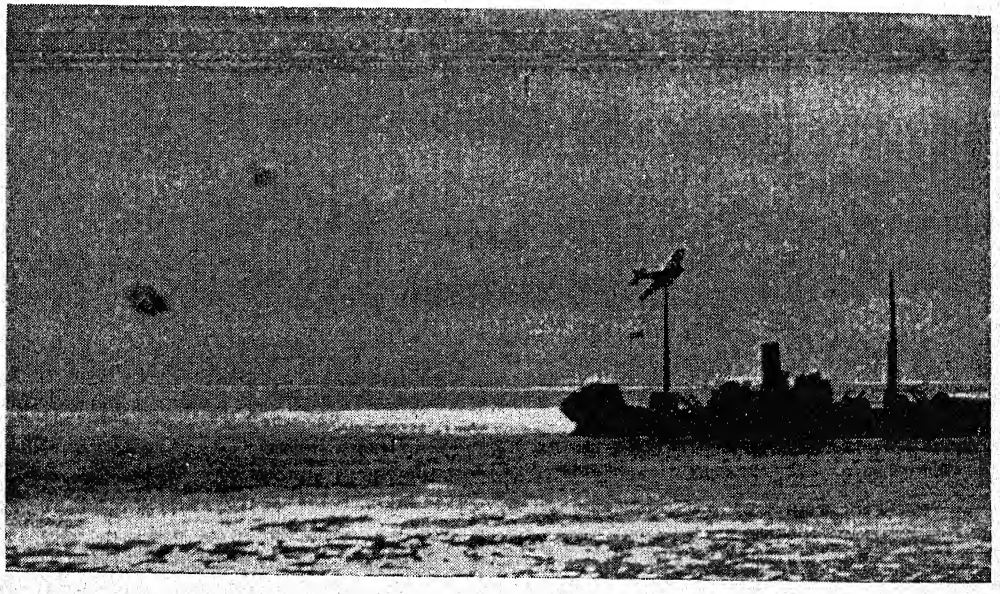
THROUGH THE MINEFIELDS

Their work, perhaps one of the most monotonous jobs of the Royal Navy in wartime, is endless. Week after week, month after month, the same channels must be swept—and week after week may pass without sight of an enemy mine.

A moment's carelessness, a moment's lack of vigilance, and disaster may come in a second to the sweeper and her crew.

Captain John Smith keeps punctiliously to the courses laid down for him. In this way, in daylight or in darkness, in clear weather or in fog, he will avoid the out-going traffic of the port, and other dangers as well. The outer approaches are mined, so that should any enemy craft attempt to force a passage into the harbour it would only be by a series of the most amazing flukes that it could avoid being blown sky-high. Captain John Smith has a wholesome respect for these minefields, whether of moored mines or of controlled mines operated from the shore.

As the end of his voyage draws near, Captain John Smith has his first encounter with the naval authorities, who now govern his every movement. A little vessel heaves in sight. Only the fact that her gun is mounted forward instead of aft, and that instead of the familiar Old Red Duster she proudly wears the White



VITAL CONVOY FOR RUSSIA BEATS

On the bitter and perilous route to Northern Russia, convoys of the United Nations have successfully withstood many fierce assaults from the air. Torpedo-carrying Heinkels swooped upon this convoy from the low-hanging clouds—they can be seen zooming and climbing

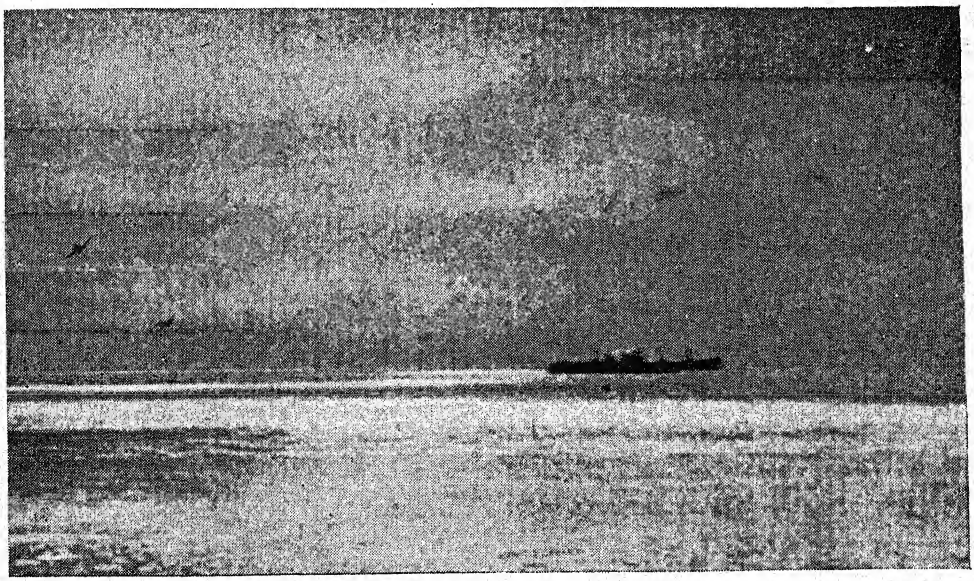
Ensign indicates that she carries the authority of the Royal Navy with her. She may be a small trawler, a converted steam or motor yacht, or even a large herring drifter or a tug ; what matters is that she is the outer examination vessel, and her job is to identify all ships approaching the estuary.

Captain John Smith hoists the flags that will prove his identity ; there is a slight pause, and then he is allowed to proceed. The outer examination vessel is satisfied that he is friend, not foe.

The *British Freighter* steams on ; and in due course she is stopped by another patrol vessel—generally a smaller type of ship—and is ordered into the examination anchorage, where, under the guns of the batteries ashore, she is to be boarded and inspected. A brief formality, perhaps, since she can so readily establish her bona fides, but the young officer—R.N.R. or R.N.V.R.—who commands the inner examination vessel has keen eyes, and experience has taught him what to look for. Although the vast bulk of the shipping entering the port is British, there is also a considerable tonnage of Allied vessels, and of neutrals ; and although magnificent work is being done by the merchant seamen of many nations—Dutch, Norwegian, Polish, Belgian, Fighting French, Jugoslav, Greek, as well as Swedish and Danish—the possibility of fifth column activity can never be overlooked for a single day.

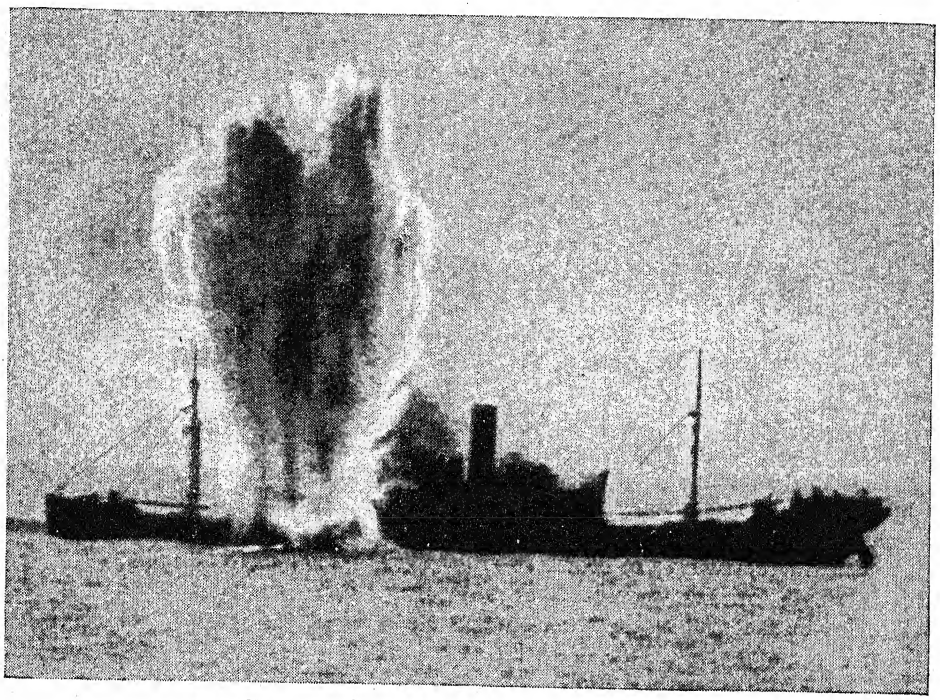
PORT DEFENCES

The outer and inner examination vessels are under the command of the Chief Examination Officer, who organizes the patrols, passes on information, and, in general, is responsible for this first link in the defences of the port. He, in turn, comes under the Extended Defence Officer, organizing and commanding the



OFF DESPERATE ENEMY ATTACK

to evade the shell bursts from the guns of the ships, whose heavy fire broke the attack and made the enemy's torpedoes ineffective. Two enemy planes were brought down, and ten others were hit. One of the ships of the convoy was sunk, but the others got safely to port



TORPEDO STRIKES A DOOMED SHIP

A German surface raider attacked this merchant ship and sank her by torpedo, after taking off the captain and crew. The track of the torpedo can be seen as it strikes home and explodes. From the deck of the raider the captain saw his ship go down. Captain and crew were saved

controlled minefields, the shore batteries, signal stations, and so on, of the estuary.

Having been released from the examination anchorage—probably without being required to anchor—the *British Freighter* proceeds up river, and picks up her pilot.

ANTI-SUBMARINE NETS

Now she approaches the inner defences —the boom, a line of anti-submarine nets stretching from shore to shore across the estuary. Boom defence vessels stand guard by "the gate," a gap which can be opened to allow ships to proceed through.

As our ship approaches, the gate is opened for her, and as she slips through the narrow gap she is identified again, both by the boom defence vessel and by the signal station ashore. Journey's end.

Now she has reached safety. Perhaps she is to proceed direct up river to dock, for the discharge of her cargo ; or is to be brought to an anchor for discharge overside, or to await a vacant berth, or to proceed to some other discharging port along the coast. The pilot has brought the orders out with him, and knows what to do ; he has also brought with him a sheaf of instructions, and a formidable questionnaire which the captain must fill up. These come from the Admiralty Berthing Officer, or the King's Harbour Master in a naval port—usually a captain, R.N. or R.N.R. on the retired list.

The Admiralty Berthing Officer's job is to control the harbour. His jurisdiction begins inside the boom, and he allocates anchor berths for all incoming ships, organizes boat services and ferries, and

works along in close co-operation with the civil harbour or port authorities.

He must know everything about the ship, not only for his own information but for that of the various officials and naval officers concerned with dealing with her and her cargo. The essential thing is to get that cargo discharged, and shipped off by rail or road or coaster to its final destination, as quickly as possible.

The instructions that Captain John Smith has to study deal with harbour and anchorage regulations, motor launch and ferry boat services, facilities and amenities, orders about anchor watch, signalling, permits for members of the crew to land, air raid precautions and fire-fighting regulations and organization, and so on.

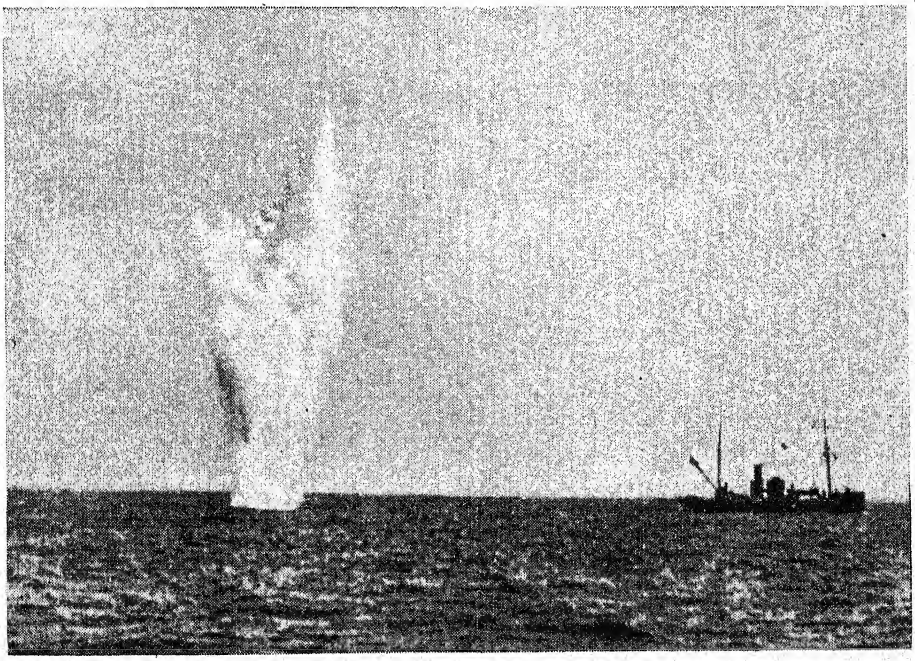
The pilot carries the completed questionnaire ashore with him, for he leaves the ship as soon as the anchor is down; and so the necessary information is in process of speedy distribution to all departments concerned.

Captain John Smith, who has been on the bridge almost continuously for several days past, has no sooner got rid of the pilot than he receives another visitor.

THE BOARDING OFFICER

He would like nothing better than to get his head down for a good twelve hours of sound sleep. But there's a war on.

This visitor is a naval officer, the boarding officer of the Naval Control Service, whose specific function is the control of all merchant shipping, coastwise and overseas. The Naval Control Service Officer requires certain information about the ship and her cargo, so



EXPLODING A MINE

The billowing cloud of smoke rises to mark the funeral of a German mine. Swept up in the North Sea, the mine has been exploded by gunfire from a trawler. The Germans have laid a great number of mines both from minelayers and from the air. Their ever-present menace to our ships is checked by the work of our minesweepers, which continually clear the seas

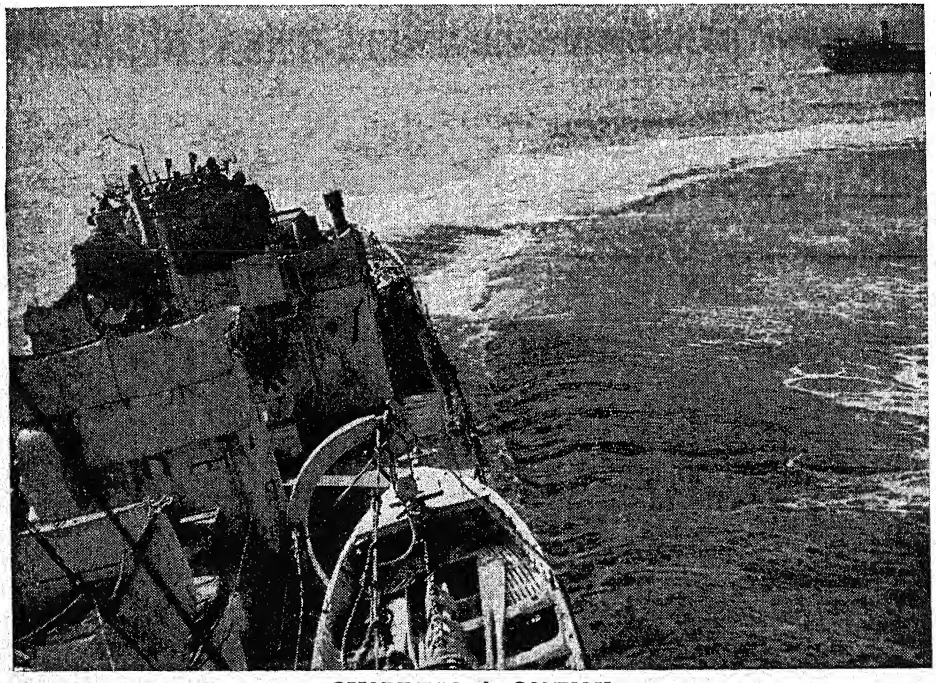
another form has to be filled up. He wants to know her speed, light and loaded, her consumption of fuel at various speeds (from which the amount of bunkers necessary for her next voyage can be calculated), her defensive armament and equipment, and so on—details which decide whether she will sail alone next time, or escorted, or in convoy, and, in that case, in which convoy she is to sail. These details must be known well in advance of her sailing, so that as soon as she is ready for sea there will be the minimum delay in getting her away once more.

REPAIRS AND ADJUSTMENTS

The Boarding Officer may obtain further information required by other authorities—what bunkers, stores, water, etc., are needed, whether the ship needs any repairs, or her degaussing equipment inspected, or her compasses adjusted, or any other work done on board. She may require replacements of crew; she may have suffered storm damage; she may have lost lifeboats. Word of her needs must be got ashore as speedily as possible.

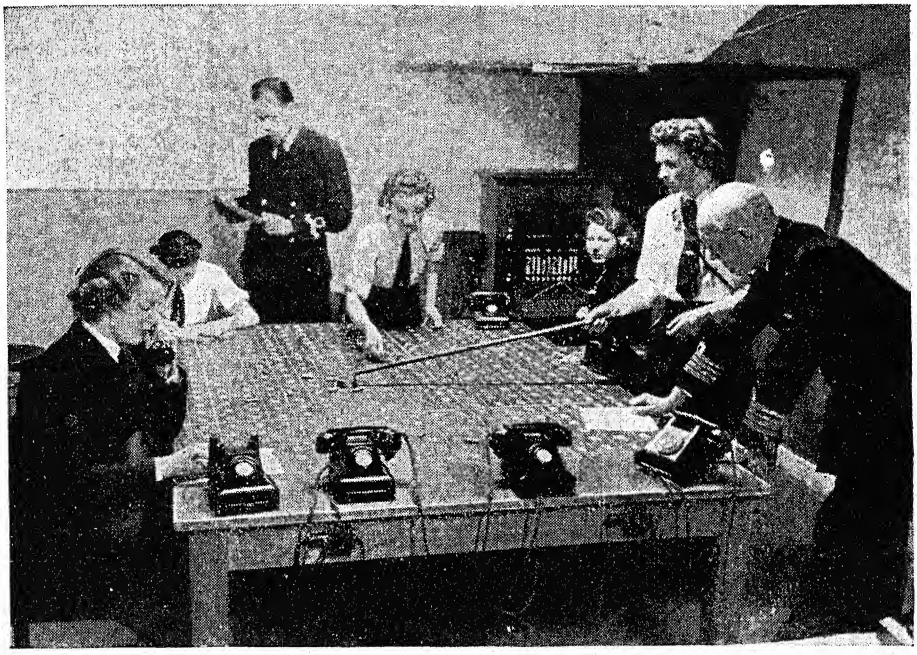
Thereafter, Captain John Smith is instructed to report ashore to the Naval Control Service; because, while all the other naval organizations have their hand in the pie, it is essentially the Naval Control Service under whose orders he acts.

Examination Service, Extended Defence, Admiralty Berthing Officer, degaussing, and all the allied branches of naval organization in a port are under the authority of the local Flag Officer-in-Charge (a vice- or rear-admiral) or the Naval Officer-in-Charge (usually a captain, R.N.). The



GUARDING A CONVOY

One of the destroyers escorting a convoy sweeps round the ships in its charge—the picture gives a vivid impression of alertness, efficiency and speed. With the protection of destroyers, the untiring watchdogs attending the merchant ships, the vital supplies of the United Nations are safeguarded, and our convoys confidently carry out their perilous journeys over the seas



WRENS IN THE OPERATIONS ROOM

Wren ratings and officers do valuable work in many branches of the Navy. In this Naval Operations Room, a signal has been received ordering a destroyer to the scene of action, and the Wren on right is moving a counter representing a destroyer to its new position

Naval Control Service, however, is in an entirely different category. There is a Naval Control Service Officer in every port of consequence, and generally a sub-office in all the smaller ports, throughout not only the British Isles but the Dominions and every sphere of British occupation or control; and each of these is directly responsible to the Admiralty Trade Division. It has its headquarters in Whitehall and its branches everywhere, each branch being self-contained and under the immediate authority of the Trade Division.

This arrangement gives the Naval Control Service Officer a free hand—subject of course to the approval of the Trade Division—in dealing with Merchant Navy vessels, without reference to the local naval authority, thus reducing naval interference with the Merchant Navy to a minimum. The arrangement also prevents any tendency to allow the interests of merchant shipping to become secondary to the interests of naval vessels.

N.C.S. PERSONNEL

While the Naval Control Service Officers are in the main retired captains, R.N., the great bulk of the personnel is provided by the Royal Naval Reserve, which is drawn, of course, from the Merchant Navy; there is, in addition, a limited number of R.N.V.R. officers, mostly with special qualifications (experience in shipping offices, or intimate knowledge of the Merchant Navy). All these officers are either medically unfit for sea service or are considered to be more usefully employed ashore than they could be at sea.

The prime function of the Naval Control Service is to get the ships across the seas as speedily and as safely as can be

managed. Their main work, therefore, is in routeing ships to their destinations, and in making up and dispatching convoys.

Let us accompany Captain John Smith as he makes his report.

His first call is at the Duty Office of Naval Control. Here he makes his report, and here the record of his ship's movements is kept up to date by card index.

FULL REPORT OF VOYAGE

The real reason for this call is the packet of instructions received at his last port, which he must now surrender intact, for destruction. That off his chest, Captain John Smith can relax and enjoy a brief chat. What sort of voyage did he have? Any incidents to report? Was he attacked at all? Has he suffered any damage? How long does he reckon it will be before he will be ready to sail? Are there any changes in the details about his ship—armament, equipment, sea speed maintainable, fuel consumption, and so on? Is there anything he wants to know? In a word, can the Naval Control Service do anything for him while he is here?

Captain Smith thinks not. But—well, where can he find the Ministry of War Transport? And—oh, yes, the Confidential Book Officer? He would like to leave his confidential books to be brought up to date, and he has a coding table to hand in. Anything else? Well, he had better see about his degaussing, and then, of course, the compasses will have to be adjusted, and there's the question of a kite balloon.

He learns where he will contact everybody he wants to see, and so goes on to the Confidential Book Officer, usually a paymaster lieutenant, R.N.V.R., or more recently, a Wren officer. There are Wren ratings employed as confidential book correctors, and their familiarity with every modification and alteration makes it an easy matter for them to bring his books up to date, a job which would take him many hours, even days, of close work.

Then, unless the Naval Control Service Officer wishes to see him personally, to raise any point concerning his route, or his ship, he goes on to the Ministry.

The Ministry of War Transport—formerly the Ministry of Shipping—is the authority concerned with all the business of ship management, cargo discharge, and so on.

Its members are all men of long experience in shipping or rail and road transport. Some are not paid by the Ministry, receiving their salaries from the shipping companies and agencies who have lent their services; others are in the category of temporary civil servants.

The Ministry has had ample warning of the expected arrival of the *British Freighter*. The local representative has made all arrangements for quick discharge of her cargo. Warehouses, rolling stock, the whole complicated structure of commercial transport—these have been arranged for well in advance, so that the cargo, whatever it may be, will reach its ultimate destinations—the factories and workshops, the warehouses, the shipyards, the wholesalers, and the shops—with the least delay.

TRANSPORT PROBLEMS

That is normal peacetime work, speeded up to meet wartime requirements. But it is vastly complicated in wartime by the enormous calls on transport necessitated by the movement of large bodies of troops, or huge loads of military and naval stores and equipment.

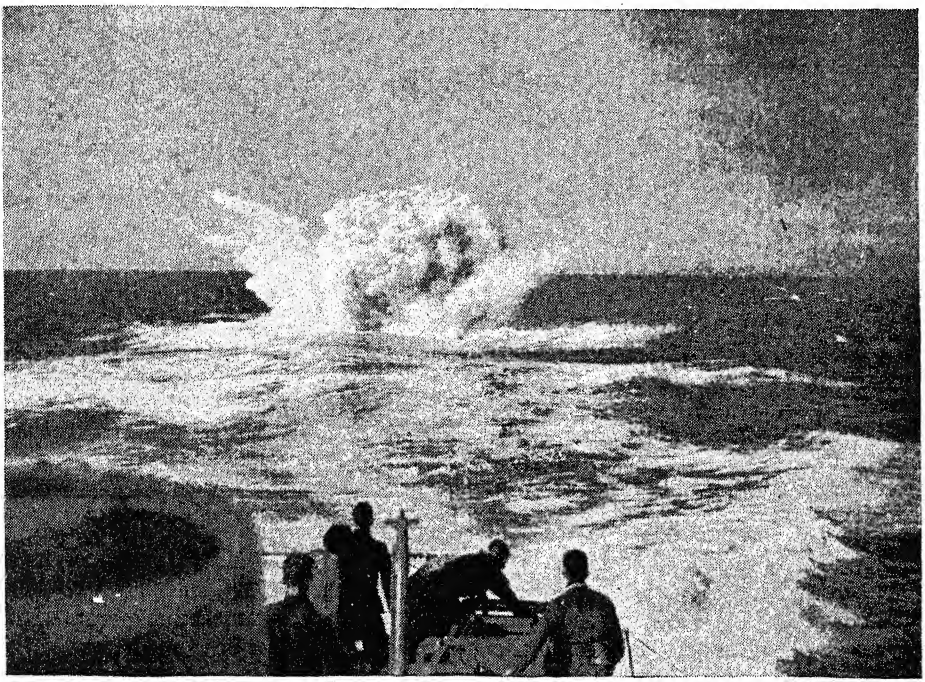
But how seldom does this normal work proceed normally! Storms, concentrated U-boat attacks, or fog may force a convoy to disperse. Engine breakdowns, storm damage, all manner of things may cause a ship to fall behind, to straggle, or even, in certain cases, to push on ahead of her convoy with the result that she arrives not at the time anticipated but even several days ahead of it.

Ships bound for one port may be compelled to put into another. Cargoes urgently required elsewhere may be brought into port through stress of weather or other circumstances over which the master has no control. And then the fun begins.

What is her cargo? Is it consigned to the Ministry of Supply or the Ministry of Food? Is the ship damaged? Will she require repairs here—and, if so, how long will they take? Telephones tinkle, urgent priority calls go through, questions are asked, orders are given, the lines hum.

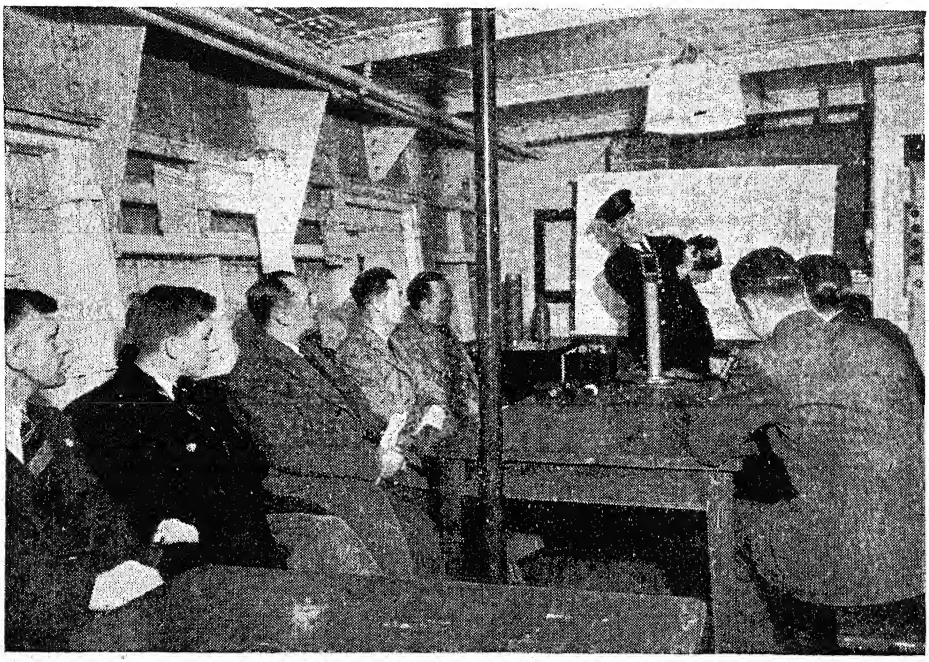
Can the ship be docked in the river? Can the port accept her cargo? Can the railways handle it? What warehousing facilities are available? Exactly how urgent is it? What coastal craft are free at immediate notice to tranship cargo? What subsidiary ports could receive it?

The ship needs repairs. Very well. Another department immediately takes a hand—the Director of Merchant Ship Repairs. Surveyors are rushed out, they inspect the damage or breakdown, and a preliminary report is rushed ashore. Repairs will take forty-eight hours, or a week, or a fortnight. The chief engineer of the ship has already got the repairs in hand; or if he is unable to do anything, the ship must be docked. If she has to be docked, and repairs are likely to take a week or so, then her cargo must be discharged while the repairs are being done. The way in which the job is to be tackled must be arranged so that it will not interfere with the discharge of cargo—and the discharge



HUNTING THE U-BOATS

Exploding depth charges have just been dropped by the destroyer over the spot indicated by the submarine-detecting apparatus, and members of the crew are eagerly awaiting evidence to register the end of another U-boat. Destroyers and corvettes employed on escort duty to convoys are responsible for many U-boat sinkings in the Battle of the Atlantic



SEAMEN AT GUNNERY SCHOOL

The ships of Britain's Merchant Navy are now armed to meet all emergencies, and the men who man the ships must learn how to man the guns. They are willing pupils. Instructors from the Royal Navy train the seamen in gunnery, and themselves learn the handling of new weapons at a gunnery school. Here an instructor is teaching the use of Marlin A.A. guns

of cargo must not hinder the repairs.

Nowadays it is no longer a question of a shipowner losing a little money by the slow turn-round of a ship. It is a matter of life and death to a whole nation. The leisurely ways of peace are forgotten; the ship is no longer merely a source of profit and dividends; she has become one highly important unit in a vast and vital organization which is an Empire's lifeline.

MINISTRY OF WAR TRANSPORT

So the Ministry gets to work—and, like the Navy, the Ministry works twenty-four hours a day. Its offices are manned continuously. "It'll do in the morning," has dropped out of its phrase book; and gone are the early days of the war when ships might lie at anchor for days before beginning to discharge their cargoes.

Captain John Smith, then, interviews the Ministry of War Transport.

He answers more questions, hears what arrangements have been made, and then comes the question of his next voyage. His orders have already come through. On completion of discharge, he is to sail for Halifax, or New York, or the Mexican Gulf, or Spain, or West Africa, or South Africa, or India, or Australia, or anywhere else in the Seven Seas. He may load cargo outward, or sail in ballast. More often than not, he sails in ballast unless there is a cargo absolutely ready, for a country at war has little time to spare for the export trade of peace.

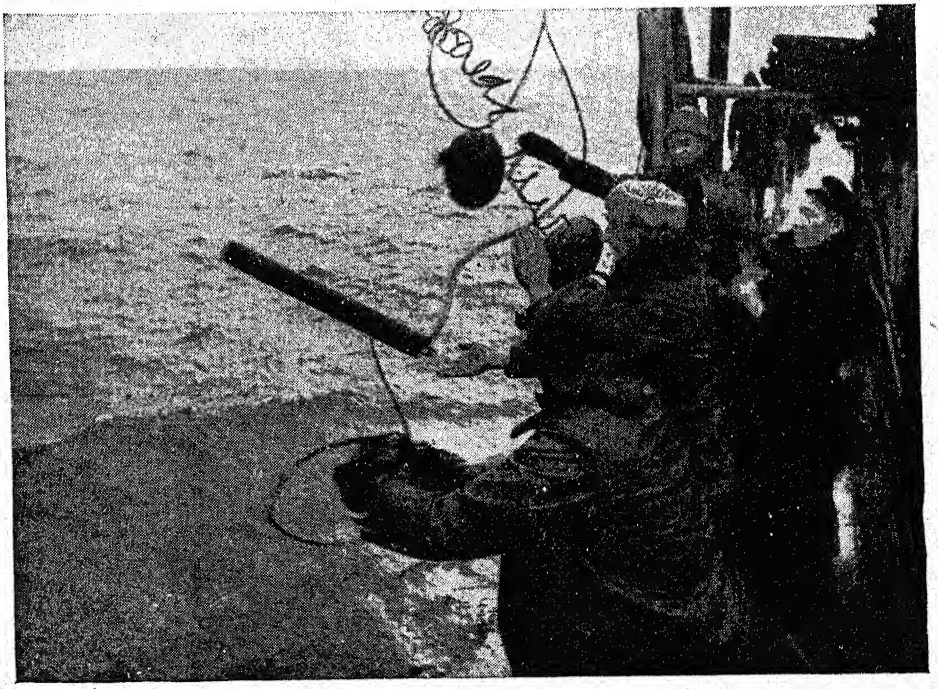
But even before he starts discharging, Captain John Smith knows where he is going next—and gets to work preparing for the outward voyage. First of all,

bunkers: how much does he need? Very well, arrangements will be made accordingly. There are colliers and oilers available. Water? It will be delivered. Stores? That matter, too, is thoroughly organized. And now comes the crucial question—his crew. Is he signing off? Is he short? Is he dissatisfied with any of his men? This is where the Seamen's Pool comes in. It operates simply and effectively.

This is a new organization which became urgently necessary when it was made clear that the old casual system of signing on and paying off crews after each voyage would not do in wartime. Between voyages, the seafarer had been nobody's business. A steady man would always be fairly sure of being re-engaged when his ship was ready to sail again; but there was no security about it, and no guarantee that the spell on the beach would be short enough for his money to last out. It was all far too haphazard, and the merchant seaman had every right to feel himself badly treated in comparison with the skilled men in other trades of importance.

HOW CREWS ARE FOUND

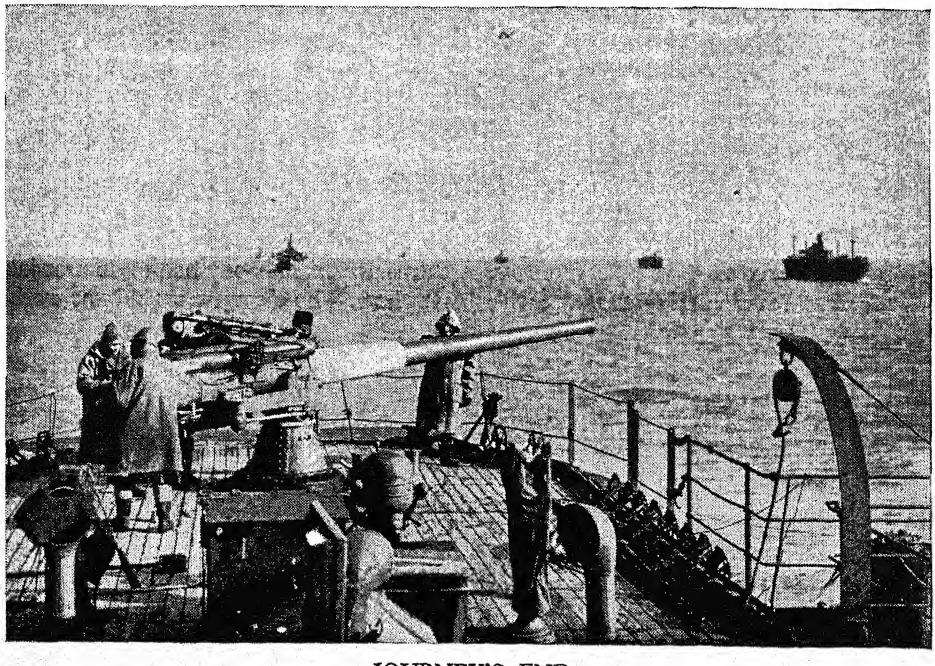
The pool was intended to do away with the disadvantages of the old system from both points of view—that of the seaman himself, and that of the owner. Finding his crew had always been one of the jobs a captain had to attend to himself. But with the enormous increase in his responsibilities and his work brought about by war conditions, it became a sheer impossibility for captains to round up crews themselves. Somebody had to do that job for them. The old ways would not work.



FIGHTING THE MINE MENACE

After first making use of the moored mine, the enemy employed the magnetic mine as a new underwater threat to our ships. Members of a minesweeper's crew throw out one of the units of the magnetic sweeper, showing the sinker and the floats, which are known as blobs

Not only that, but it was very much more difficult to find crews. The war was weeding out the poorer material, the men who were only concerned with putting up with the hardships of the round trip for the sake of the cash at the end of it, and a spree. And there was another vital difficulty. Under the old system, there was no kind of priority, no guarantee that the ship the captain's behalf, and, if the men he needs are not available in that port, there will be others in other ports who can be sent for, and who will be put into the first train and sent to join, irrespective of the distance they have to travel. All that matters is that the ship gets her full complement of men, and that they are all on board in good time before she sails.



JOURNEY'S END

Fig. 2. *Thousands of guns of many types have been fitted to our merchant ships, and these guns have enabled them to repel countless enemy attacks by surface raiders, by U-boats, and by aircraft. Ranging from light machine guns to big naval guns, they are manned by merchant seamen gunners. Picture shows the gun crew of an oil tanker cleaning a 4·7-inch gun as their convoy reaches safe waters near the home port. Outgoing convoy on right*

which had to get away within a few hours would get preference over the ship that was not to sail for several days.

The pool obviates these delays. All seamen, on being discharged, revert to the pool—and receive their wages while ashore. At any time, they may be required to report on board a certain ship, sign on, and sail forthwith. So the Ministry of War Transport gets in touch with the pool on

That question disposed of, Captain John Smith collects permits for his crew to come ashore—without these, in ports where the piers or wharves are defended areas, they would not be allowed to land—and goes on to report to the Director of Merchant Ship Repairs. If he has nothing to report, he is received with affable thankfulness; if he has a defect list to hand over, the D.M.S.R. officials get to work on it

at once. It may be that a winch has broken down, or the engine-room telegraph is faulty, or there has been some trouble with the main engines, or the pumps, or the steam steering gear. Jobs like that can be carried out while the ship is discharging cargo.

And, at last, Captain John Smith is free to go and see the man who in peace time would have been the only person he had to bother about—his agent, who represents his owners in the port and who, in peace time, would have done all his business, leaving him a spell of freedom ashore.

STORES AND GUNS

So he reports to his agent, and gets all the details from him that he has not been given already, and arranges about stores, and goes over the ship's papers, and gets back for a little while into the old familiar atmosphere: although even here there is a great change. Girls and young lads have taken the places of the older shipping clerks, some of whom have gone into the Services, others into the Ministry of War Transport or other Ministries where their special training and ability are important.

But Captain John Smith has still a great deal yet to do before he can take a rest. He wants to see the officers of the department of Defensively Equipped Merchant Ships, known generally as D.E.M.S. When the war broke out, there were over two thousand British merchant ships on the high seas. Since then, there has never been less than that number, often very many more, and to date more than thirteen thousand guns of all kinds have been fitted to these ships (Fig. 2). That total represents a vast amount of urgent work, and also a vast amount of experiment, trial and error, experience, forethought, and expert knowledge.

Innumerable attacks on individual ships and on convoys have been beaten off by these guns—attacks by surface raiders, by U-boats, and by aircraft. The men who man them have done, and are doing, a great job of work with a coolness and precision worthy of the highest traditions of British seamanship.

The guns range from light machine guns of the shoulder type to big 6-inch naval guns, and the job of fitting them has presented many problems; for British ships were built for peaceful trade, not for war.

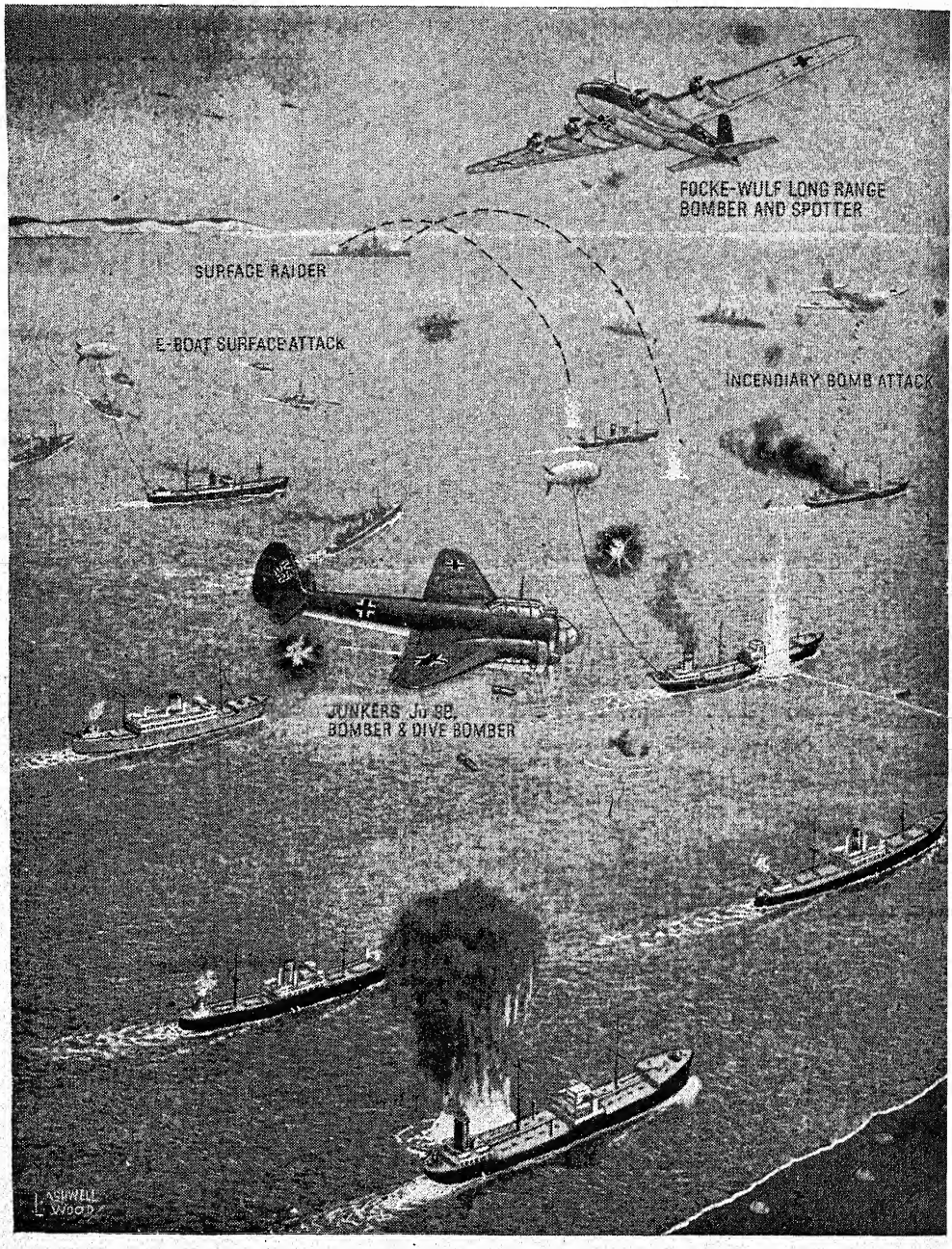
You cannot simply mount a heavy gun —or even a machine gun—on the deck of a ship. Considerable strengthening of the structure is necessary first, and many other things have to be taken into consideration. The gun must be mounted where it will do most good, where its crew can reach it quickly and get it into action on the shortest notice, where it will not be rendered useless in heavy weather and where it will not interfere with the normal working of the ship.

So it was necessary for scores of experts to carry out inspections and to make structural alterations before the guns could be fitted. And when they were fitted they had to be manned.

GUN CREWS

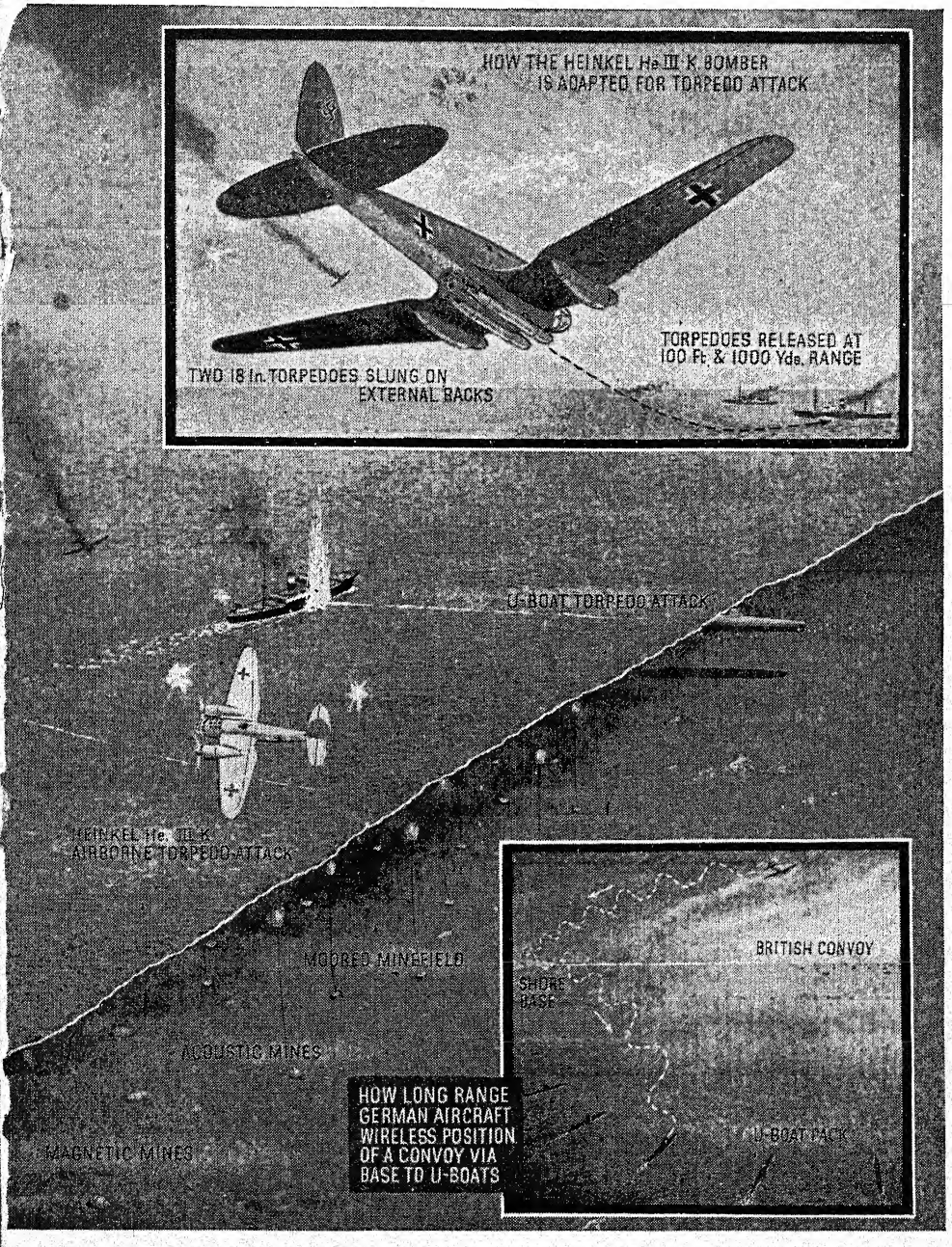
They had to be manned, too, by men who could give their whole time to the job. The purely volunteer crew from among the ship's company is not sufficient, since ships' companies in the Merchant Navy are always the minimum needed for working the ships: there are no spare hands. So, in addition to the large number of regular seafarers, deck hands, seamen, firemen, cooks, stewards, as well as engine-room and deck officers, who underwent gunnery training, there was created a corps of merchant seamen gunners, mostly young fellows who were keen to do their bit at sea, and signed on with the crews for the specific job of manning the guns in the danger zones.

Meantime, while the ship is in port, an officer from D.E.M.S. will pay her a visit,



ON EVERY VOYAGE OUR CONVOYS ARE

Fig. 3. *The enemy employs many weapons and many methods. Convoys have to meet torpedo attack from U-boats, E-boats, and from Heinkel bombers adapted to carry torpedoes (inset, top). They can be shelled by surface raiders, and are harassed by incendiaries and high*



THREATENED FROM SEA, UNDERSEA AND SKY

explosives from aircraft. Beneath their keels, contact, magnetic, and acoustic mines are constant perils, but the convoys get through with their cargoes. Long-range German aircraft wireless convoy's position (inset, bottom) to the waiting U-boat pack

and inspect her armament. His job is to see that all the defensive equipment is in perfect order before the ship sails again.

But guns—machine guns, 12-pounders, 3-inch, 4-inch or 6-inch naval guns—are only a part of a merchant ship's defensive equipment. There are many other things, inventions of several kinds that have been produced to meet the constant threat of submarine and bombing attack. There are the reinforced bridge shelters to protect the men on the bridge from machine gun and cannon attack by aircraft, from bomb splinters, and from shells. There are gadgets designed to ward off bombing and machine-gunning attacks, or to interfere with the bomber's aim. There are kites and captive balloons to be flown above the ship.

Captain John Smith may send word that he requires replacement of this and that, or that he wants to make sure of being given a balloon before he sails again. He cannot afford to delay his ship—and he cannot afford, either, to sail unless all his defensive equipment is in first-class order.

Very little imagination is needed to visualize the many dangers threatening Captain John Smith's ship, as she makes her way over the hostile seas (Fig. 3).

Whenever Captain Smith's ship approaches shallow water, the mine is a great danger. There are several types.

CONTACT MINES

Mines have been used, in one form or another, for centuries. But the present war has seen a tremendous intensification of mine warfare, and a great deal of ingenuity has been shown in devising new mines and means of dealing with them.

The standard type of mine is the moored mine, which is laid in comparatively shallow water in the approaches to harbours. It is a contact mine, exploding on impact, and in principle it is simple. The main charge is electrically fired, and for this purpose a complete electric circuit is incorporated. But the batteries are dry, there is no acid in them and so they are not live. The acid is contained in glass phials protected by metal covers, which are the horns of the mine. If one of these horns is crushed by impact against a ship's hull, the glass is broken, the acid pours down into the batteries, the circuit becomes live—and the mine is detonated.

THE MAGNETIC MINE

But a much more subtle type of mine was soon in use—the magnetic mine. This is detonated not by impact, but by the movement of a compass needle which is affected by the magnetic field of the ship passing near or over it. It is laid, therefore, on the sea bed, usually in shallow water, because the magnetic field of a ship does not extend very far; and its effect is infinitely greater than that of the moored mine (Fig. 4).

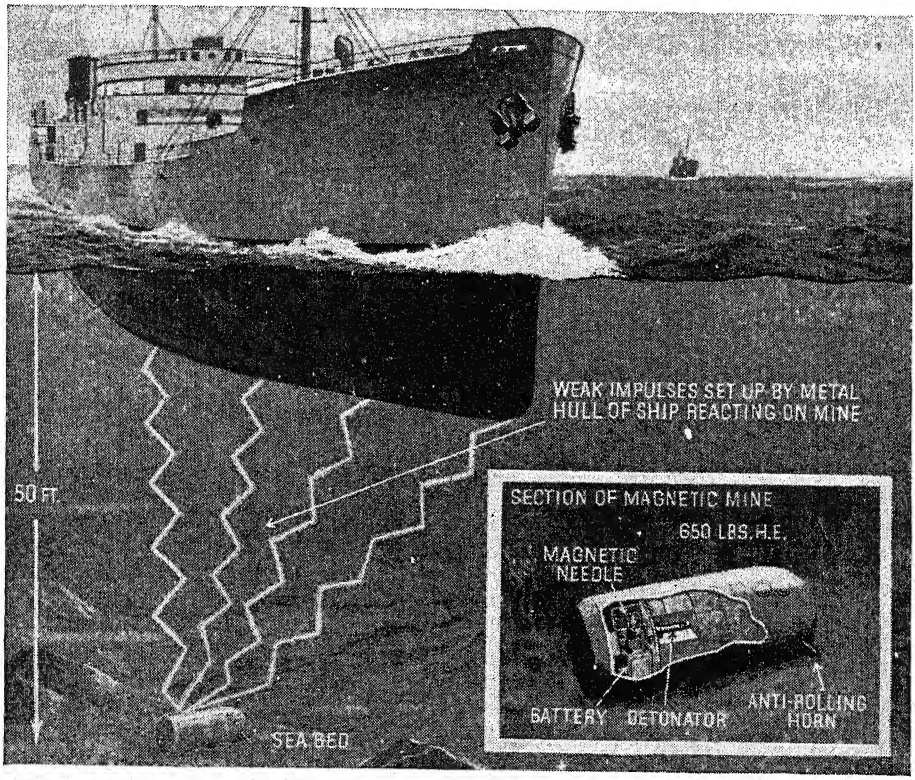
There is a very simple reason for this. The force of an explosion takes the line of least resistance. Water offers great resistance, which increases with depth. A mine striking a ship's side is near the surface, and the force of the explosion is dissipated. It will spread out in all directions, and only part of it will burst through the ship's side. But when a mine explodes underneath a ship the circumstances are very different. The thin shell of a ship's bottom offers far less resistance to the explosion than the solid weight of water all around it; so the explosion goes directly upwards through the ship, and thereby achieves an infinite deal of damage.

The magnetic mine took a heavy toll before British scientists, working at feverish speed, evolved means not only of sweeping it, but of protecting ships. The method evolved is known as degaussing. Briefly, the ship's magnetism is neutralized, and thus it does not actuate the compass needle that controls the trigger of the mine (Fig. 5).

But degaussing requires frequent overhaul and testing; so the Degaussing and Ranging Officer in the port examines the master's report and decides whether a test is required. If so, arrangements are made for the ship to go over the range, where the efficiency of her degaussing is measured. If it is all right, she is free to proceed immediately. If not, the ship is held until necessary adjustments are made.

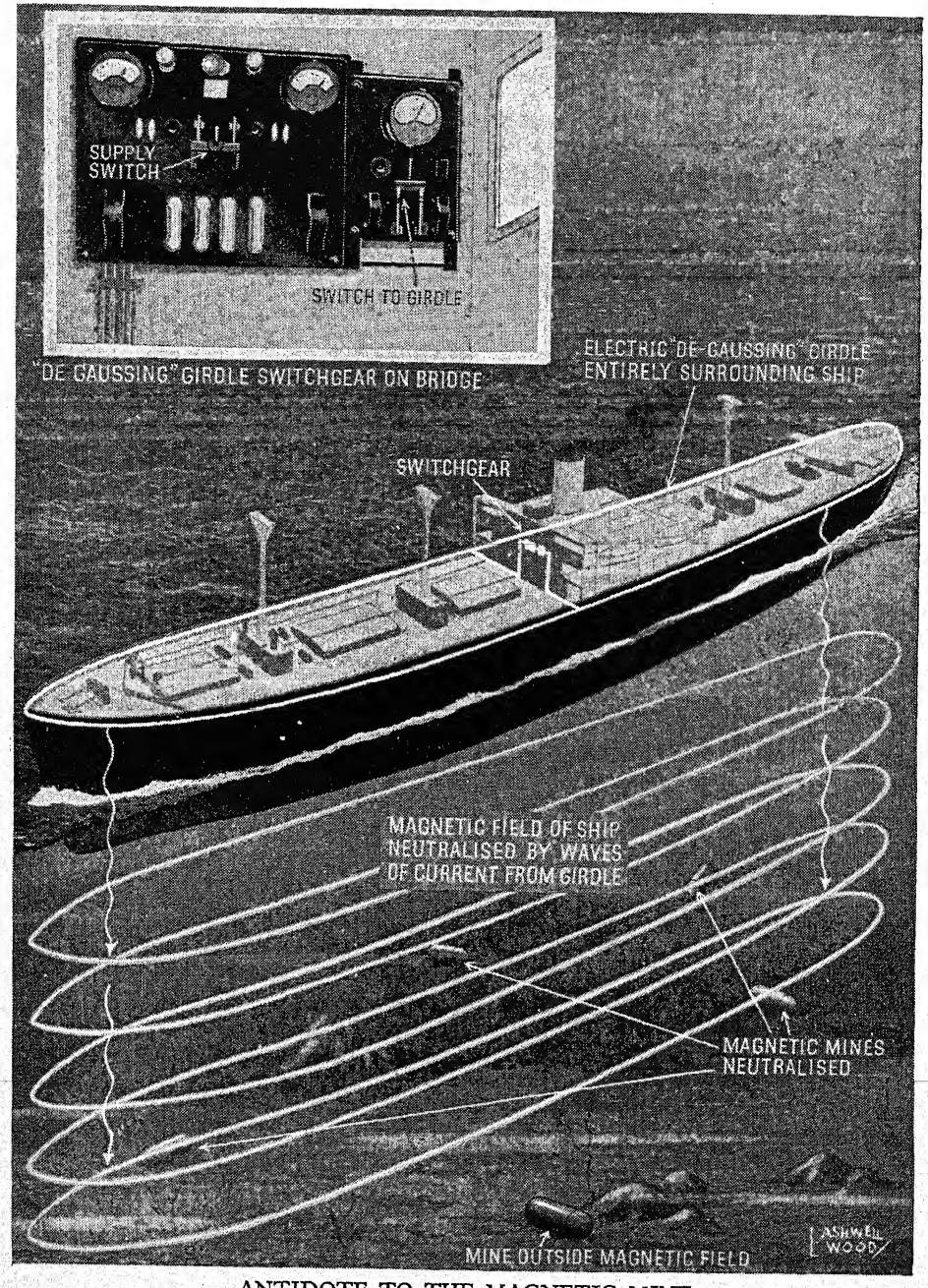
Working in with the Degaussing and Ranging Officer are the compass adjusters, civilian experts who work on a pool system, so that one is always available. It follows that, if the degaussing has had to be altered, the ship's compasses will be affected, and so will require adjustment. That is done first of all by swinging the ship and taking bearings on known objects or fixed landmarks ashore, and so finding out the errors of the compass, then making the necessary adjustments to compensate for them. Needless to say, the work of the compass adjusters has been enormously increased by the introduction of this magnetic warfare.

The approaches to all harbours are regularly and methodically swept by a great fleet of minesweepers of all types, from converted drifters and trawlers to



HOW THE MAGNETIC MINE WORKS

Fig. 4. *The magnetic mine operates successfully only in shallow water. It comes to rest on the sea bed in such a position that the magnetic needle is always uppermost. When a ship passes over it, weak magnetic impulses from the metal hull react on the needle, which moves upwards, and fires the charge of 650 lb. of high explosive by means of an electric circuit and relays. It is far more devastating than the moored mine. Inset, details of mine*

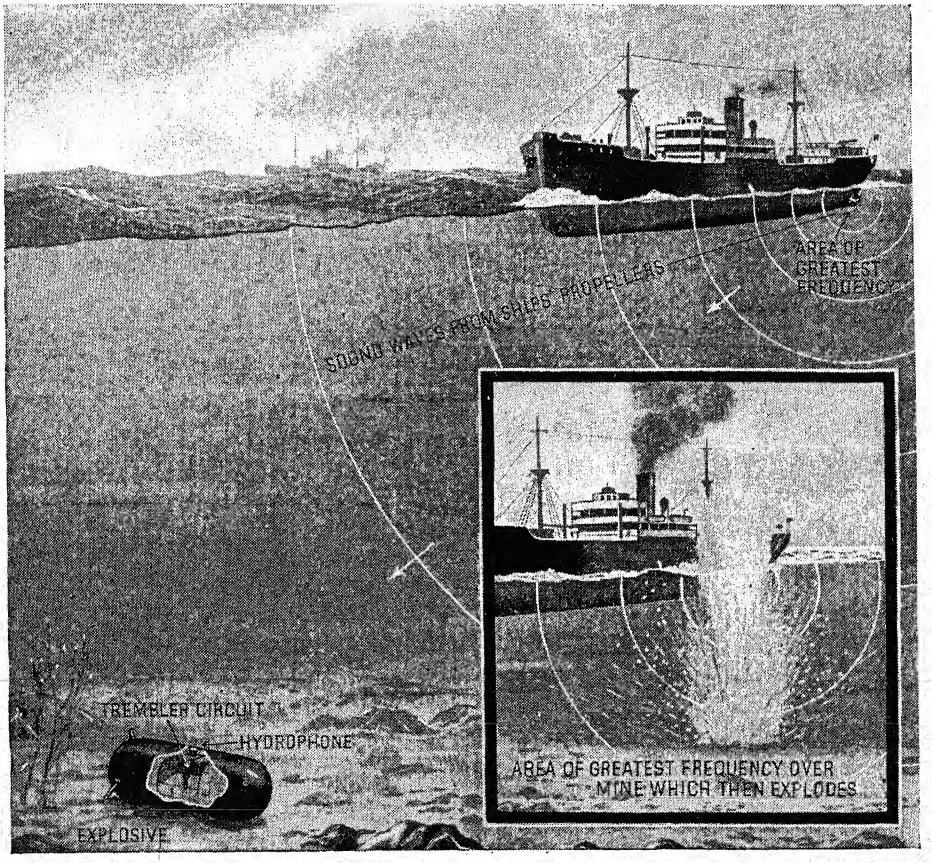


ANTIDOTE TO THE MAGNETIC MINE

Fig. 5. *The menace of the magnetic mine was, to a large extent, overcome by the ingenious degaussing girdle which was fitted to British ships. Current supplied to the girdle by a generator causes electric waves to pass down to the sea bed and render the mines inoperative*

large, specially constructed fleet minesweepers; and this untiring and hazardous labour has accounted for very large numbers of enemy mines, and has undoubtedly saved a great many ships from being blown up or seriously damaged.

or sunk by rifle fire. Then the magnetic mine was introduced, and took its toll before counter measures were designed. Later still came the acoustic mine, in which the pistol is actuated by sound—not by the ship's magnetism, but by the



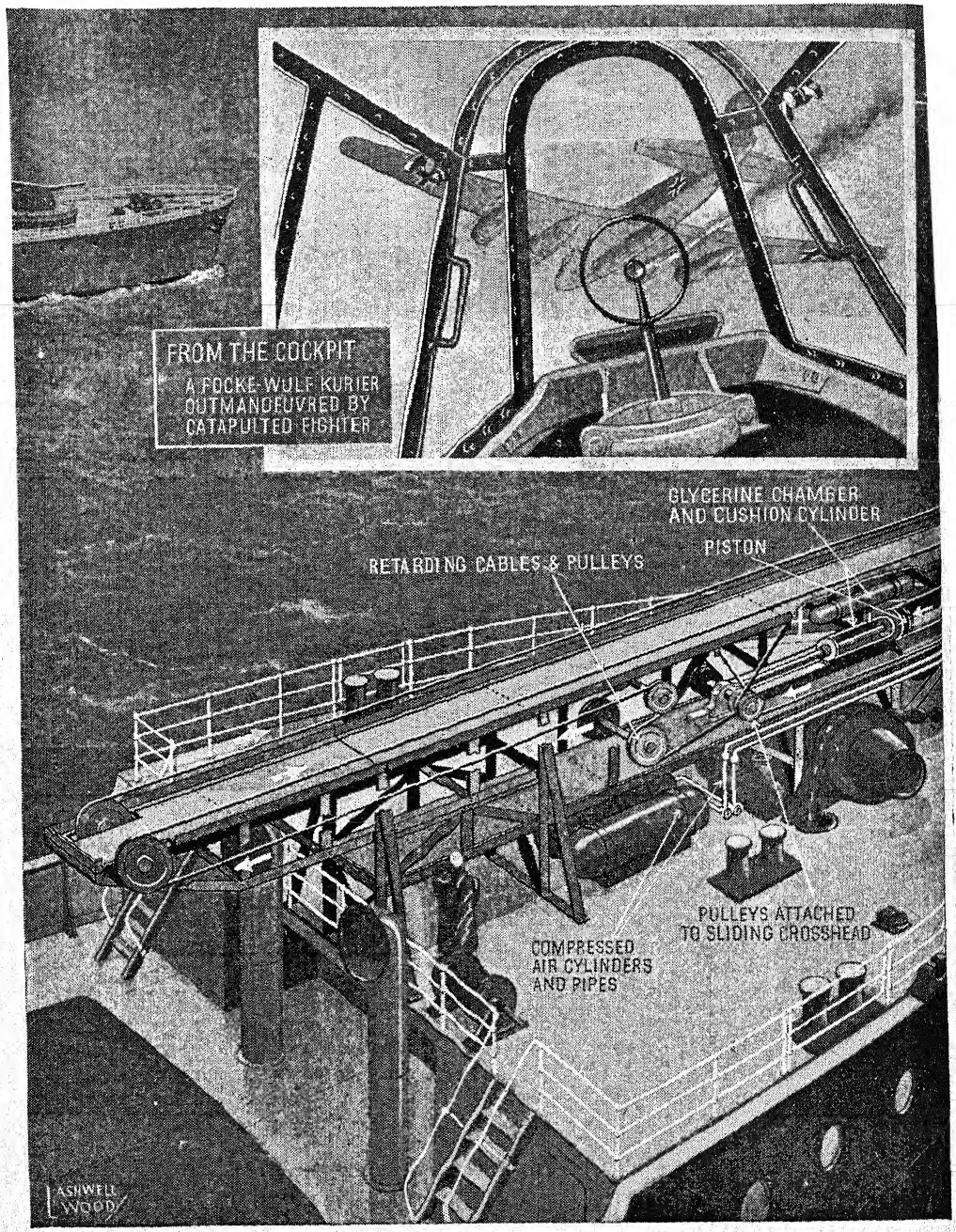
ACOUSTIC MINE

Fig. 6. *Following the magnetic mine, the next development was the acoustic mine. In some respects similar to the magnetic, it is operated by sound instead of magnetism. To fire the charge, a trembler circuit is touched off by the sound vibrations produced by a ship's propellers, the mine being exploded when these vibrations reach the area of greatest frequency*

At the beginning of the war the enemy made use chiefly of the ordinary moored mine, which could be dealt with by sweepers towing gear that cuts the mooring wire and so allows the mine to bob up to the surface, where it can be destroyed

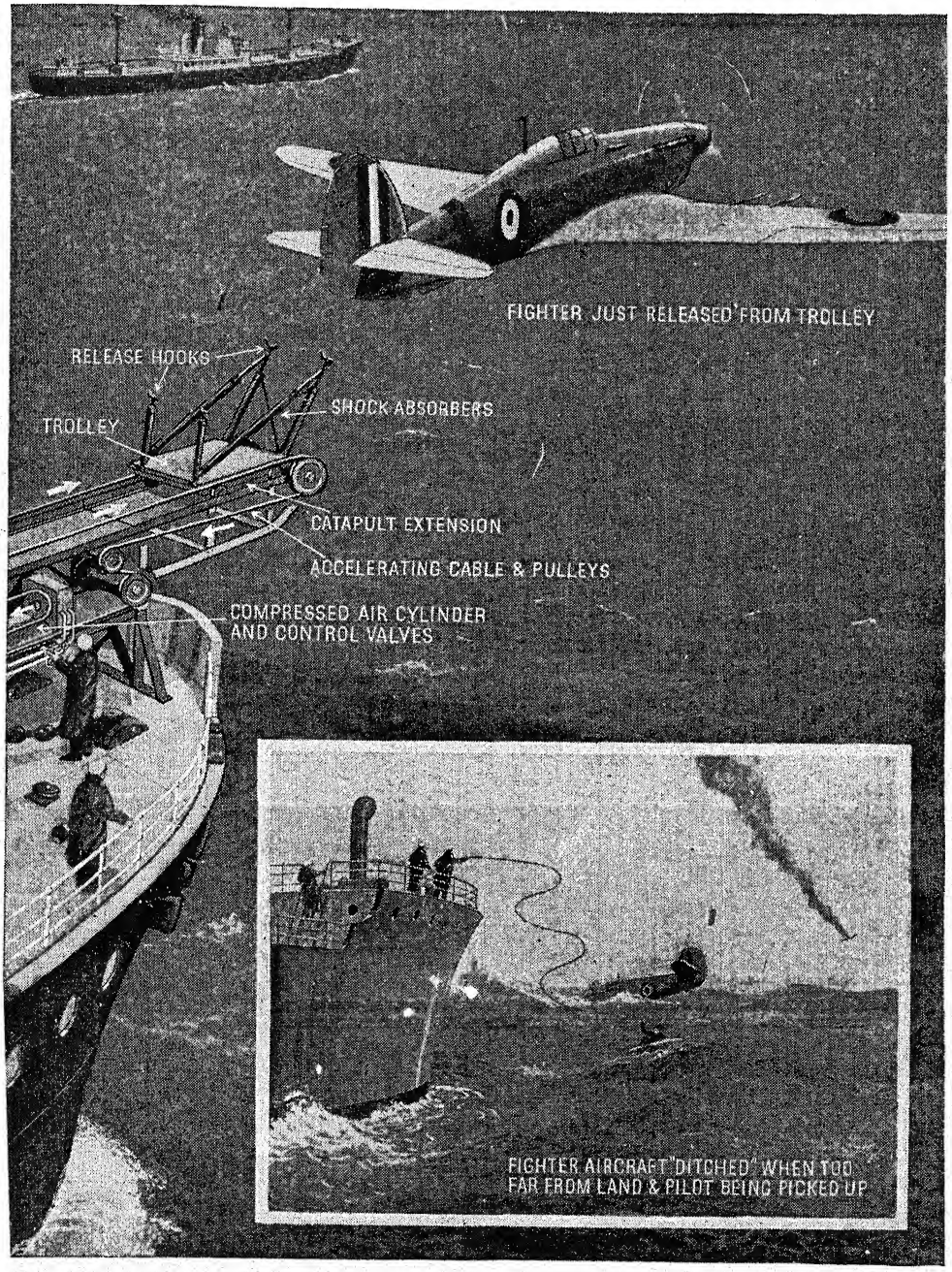
sound vibrations produced by her engines and propeller (Fig. 6). This in turn necessitated the designing of a new type of sweeper to counter it successfully.

The Merchant Navy has had to face one ever present and very real danger



HOW FIGHTER AIRCRAFT ARE CATAPULTED FROM

Fig. 7. *Some merchant ships have catapult gear, which launches fighter aircraft into the air to attack long-range Focke-Wulf Kuriers. Main picture gives in detail the method of cata-*



SHIPS TO REPEL LONG RANGE ENEMY BOMBERS

pulting. Inset (top left) shows from the cockpit of a British fighter a Focke-Wulf set on fire by a direct hit. Inset (right) shows a ditched pilot being rescued by another ship in the convoy

unknown, or almost unknown, in the last war. This was the bomber aircraft.

This threat was not serious at first; but with the fall of France, with enemy aerodromes and seaplane bases established not only along the English Channel but on the Atlantic seaboard as well—some of them within fifteen minutes flying time of vital British harbours and sea lanes, others within easy bomber reach of our convoy routes in the Atlantic—the danger became acute.

It was met by concentrated anti-aircraft fire power, not only in escort vessels, but on the merchant ships themselves; but it also led to the employment of fighter aircraft catapulted from ships (Fig. 7).

CATAPULT FIGHTERS

The fighter aircraft is launched by means of a catapult, which hurls it forward violently. At the same time, the engine is opened full out, the machine picks up speed, dipping only very slightly as it leaves the catapult, and then climbs rapidly to engage the enemy.

It is a breath-taking business. The fighter rests on the catapult, ready to be launched. The pilot climbs into the cockpit, starts up his engine—which is kept constantly warmed up, ready for instant action—and opens the throttle. The officer in charge awaits the pilot's signal. When he receives it, he launches the aircraft. Simultaneously, the pilot opens to full throttle.

It is a job for steady nerves, for firm hands and a clear head and swift reactions, for it is no easy matter to be sitting at ease in the cockpit of a stationary aircraft one moment, and to be airborne and hurtling forward at more than a hundred miles an hour the next. To be able to stand the sudden shock, and to take instant control of the plane, and switch your whole attention a second later to the business of bringing down your enemy—that calls for a very special kind of nerve.

Add to this that the chances of making a comfortable landing on an aerodrome are very remote, and you realize the kind of men these pilots are—youngsters, all of them, specially selected for the work. At sea, they are on duty continuously, ready to take off at a moment's notice. On the approach of enemy aircraft, they go into action. In a space of time that seems incredibly short, they are airborne, and as the enemy aircraft, usually a Focke-Wulf, unsuspecting, closes in on its prey, the columns of lumbering merchant ships, the fighter swoops down for the kill. And so the hunter becomes the hunted, and is shot down into the sea, or at best sent racing for home with the fighter on his tail.

And the fighter pilot? If he is lucky, he may find that there is an aerodrome within reach. But he is seldom lucky in that respect. His range is short, and even a short scrap will burn up petrol at an alarming rate. Then two courses are open to him: he can bring his aircraft down into the sea, or bale out and come down by parachute, near one of the ships of the convoy, which will stand by to pick him up. Either course is not pleasant; and it demands a high degree of expert co-operation on the part of the ship. This is particularly the case when a high sea is running and visibility is bad.

PILOT'S RISKS

So the pilot regains contact with the convoy, and makes his decision. If he thinks he can safely bring the aeroplane down on the water, he flies low over the ship, in the direction in which she is proceeding, and pancakes down a short distance ahead. But if he has to bale out, he must rely upon the ship's captain to gauge accurately the drift of his parachute, so as to be on the spot as nearly as possible at the moment when he strikes the water. In either case, the pilot is in for a very cold bath—and a very risky one. But the

catapult aircraft fliers take it all as part of their job, and many Focke-Wulf aircraft have fallen to these daring young pilots.

Captain John Smith is lucky if he has any time to himself at all in port. The quick turn round saves shipping space, makes up for shortage of tonnage. There are no leisurely refits, no casual delays, in wartime.

And while he is interviewing all these people, whose business it is to help him get back to sea, the cargo is being taken out of his ship, by gangs of stevedores, either in the dock, or into lighters if he is out in the stream.

Before he has really had time to feel that he has been in port, he is thinking of his next voyage, and soon he has fixed a date when he will be ready to begin it.

READY TO SAIL

Then he makes his pilgrimage to the Duty Officer at the Naval Control Service. "I'll be ready—barring accidents—on Saturday." He states his destination—it may be Halifax, or Boston, or New York, or Aruba, or Curacao, or Galveston, or Houston, or Lagos, or Calcutta, or any remote spot where the Old Red Duster can be seen flying. Probably he finds that his sailing date has been anticipated—his agent may have given a hint—and he is already entered for a suitable convoy. It has to be a convoy whose speed will be less than the speed he can be certain of maintaining. He must always have half a knot or so in hand—for accidents. He knows, just as well as the naval officers know, the fate that awaits the straggler. He gauges his speed conservatively, to be on the safe side. You never know these days, especially with inexperienced firemen.

Captain John Smith is entered for the first available convoy, and then he departs to interview the Ministry of War Transport and deal with any remaining business —and the Naval Control Service gets on with its job. First of all, his ship has to be allotted a definite place in the convoy.

He has to be provided with sailing orders and convoy instructions; his routes have to be worked out to his destination and he has also to be given alternative routes, and approaches to various harbours —again in case of accidents.

His convoy equipment must be in order —signalling lamp and flags, navigation and special convoy lights, blackout, fog buoys, and the rest. He has a certificate signed by a Convoy Equipment Officer stating that everything is in order. Is it up to date? If not, the equipment must be inspected again and defects made good.

There is also a Convoy Signal Officer whose business is to deal with all matters affecting his wireless equipment. This officer works in with the Post Office inspectors who test his transmitters and receivers, and who also test all the privately owned receiving sets on board.

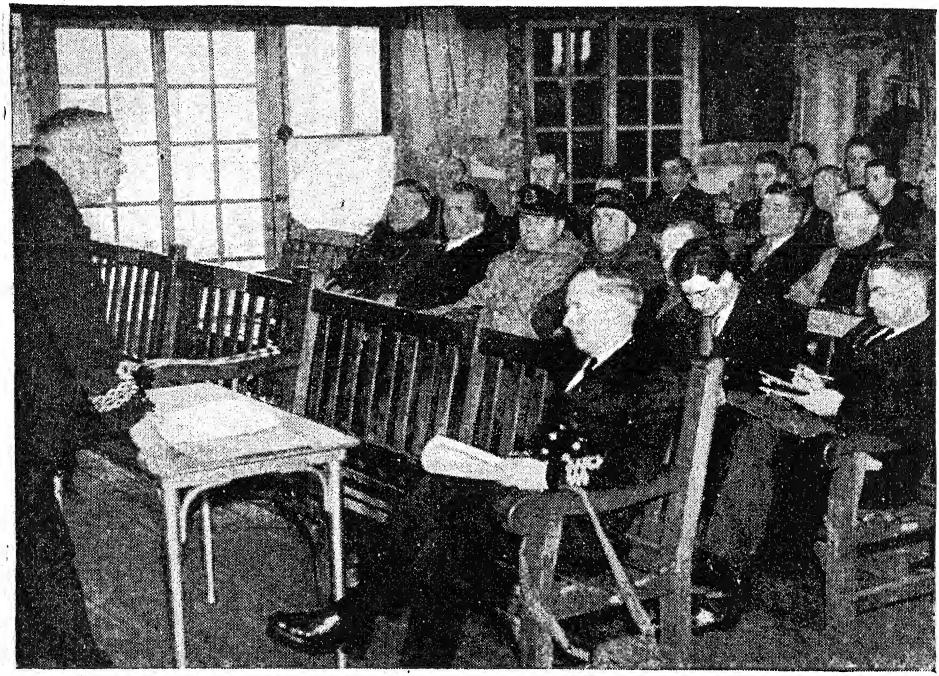
Practically all receiving sets reradiate —that is, they act as small transmitters. It is this that enables the Post Office officials to detect wireless licence dodgers by locating their sets. It is this that might betray a ship to the lurking U-boat; and so every set must be tested meticulously; and in many cases sets have to be sealed up and condemned as unfit for use at sea.

CONVOY CONFERENCE

There seems, in fact, to be no end to the innumerable details that must be thought of before a ship can go to sea.

But at last the day of sailing arrives, and Captain John Smith goes to attend the convoy conference (Fig. 8).

A launch is sent to collect him and the other masters—just a part of the service, and seemingly an insignificant one, but somebody has to sweat over it, for it is no simple matter to keep a fleet of launches in service, day in, day out, in all weathers, and with scores of people clamouring at all hours for boats.



ORDERS FOR THE VOYAGE

Fig. 8. *The convoy is soon to sail. Now the masters of the ships attend the conference at the offices of the Naval Control Service, to receive full instructions regarding the course to be taken, the position their ships must keep in the convoy, action in emergencies, speed, and special signals. The R.N.R. officer in front row, commodore of the convoy, will command the fleet. Every possible mischance on the voyage is considered and guarded against*

The conference is held generally at the Naval Control Service offices, in a special room. The Naval Control Service Officer presides, and when the masters have assembled, and have reported to the Duty Officer, he plunges directly into what he has to say. He is as brief as possible. He runs through the convoy instructions, making certain that every one understands every detail—and taking particular care that Dutch, Norwegian, Greek, Belgian, French, Panamanian, Swedish, and other Allied and neutral captains have grasped every word, every phrase. Then questions may be asked, points may be raised and discussed, and the commodore of the convoy—a commodore, R.N.R., who is usually a retired rear admiral, R.N., serving in this rank—addresses the conference. Every minute detail, every conceivable eventuality, is considered. Nothing that could possibly happen to create confusion, or difficulty, or crisis is overlooked. Fog, storm, bombing attack, U-boat attack, surface raider attack, engine breakdown, damage due to stress of weather, collision, the closing of a harbour through enemy action—there are precise instructions covering everything.

And so the conference breaks up, and the masters are pounced on by the Ministry of War Transport. "Is your crew complete? Got all your stores, bunkers, water?"

"No defects? No last-minute hitch likely to delay you? All right, captain. Good-bye—and good luck!" The masters leave, in little groups. They are satisfied.

There is nothing more to be done—except to be ready to sail at the given hour.

Under weigh! Anchors have been hove short as zero hour approaches. The Boarding Officer is going his rounds, in his launch, hailing each ship.

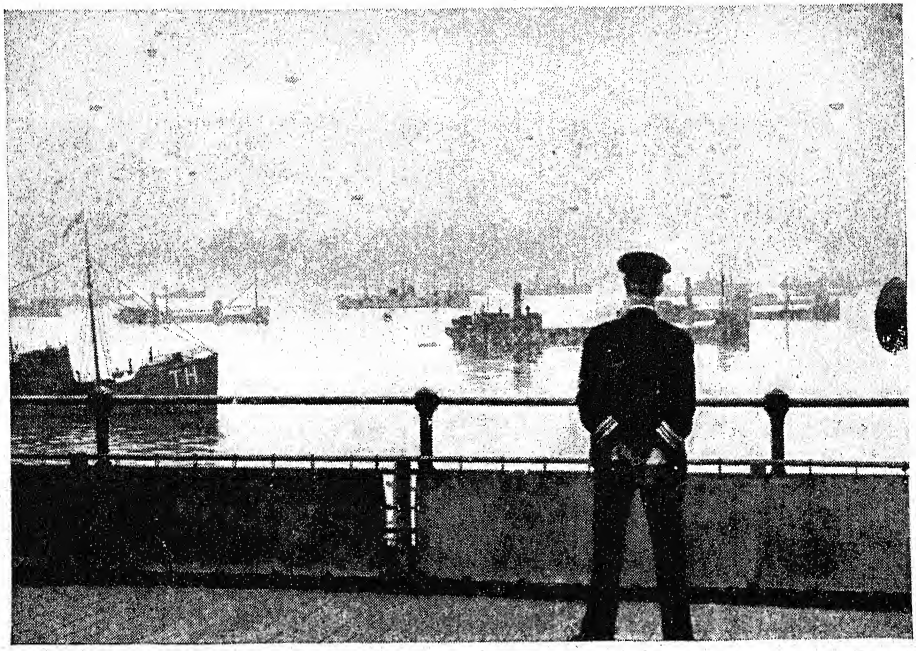
"All correct, captain? Fine—good-bye. Take care of yourself. Good luck!"

LAST MOMENTS BEFORE SAILING

The commodore signals. He is getting under weigh, moving down to the gate, to pass out through the boom and lead the way down channel. Many convoys sail at night, for a variety of reasons. But daylight or dark, it makes no difference. One after another the ships slip out, at regular intervals, through the gate.

Ashore, men are watching. The signal station has the list of ships, telephones through as each ship is identified passing out. The Naval Control Service officers are waiting for the last ship to go through, which means that the convoy has sailed, and word can be passed on to all the departments concerned. The Ministry of War Transport's officials are on the pier, waiting—ready for any last-minute emergency.

One ship has not weighed anchor yet. What is wrong? Why is she delaying? The Boarding Officer flashes a signal ashore. Two men short. Should have arrived by train three hours ago—no sign of them. The Ministry gets to work. It telephones for two more men—two local men who can be routed out—it may be one o'clock in the morning, but no matter! —and hustled out to the ship. Telephone to the N.C.S.O., and find out how long



READY TO GO

Now the convoy assembles off the pier. The ships are ready to slip out, one by one, through the boom, and sail down channel on the first stage of another hazardous voyage. Each ship knows its place in convoy, allotted according to tonnage and destination. All emergencies are provided for, and no measure which contributes to the convoy's safety has been overlooked

grace the ship can have. If she has several knots in hand beyond the convoy speed, she may still be able to sail, and overtake it, some hours later.

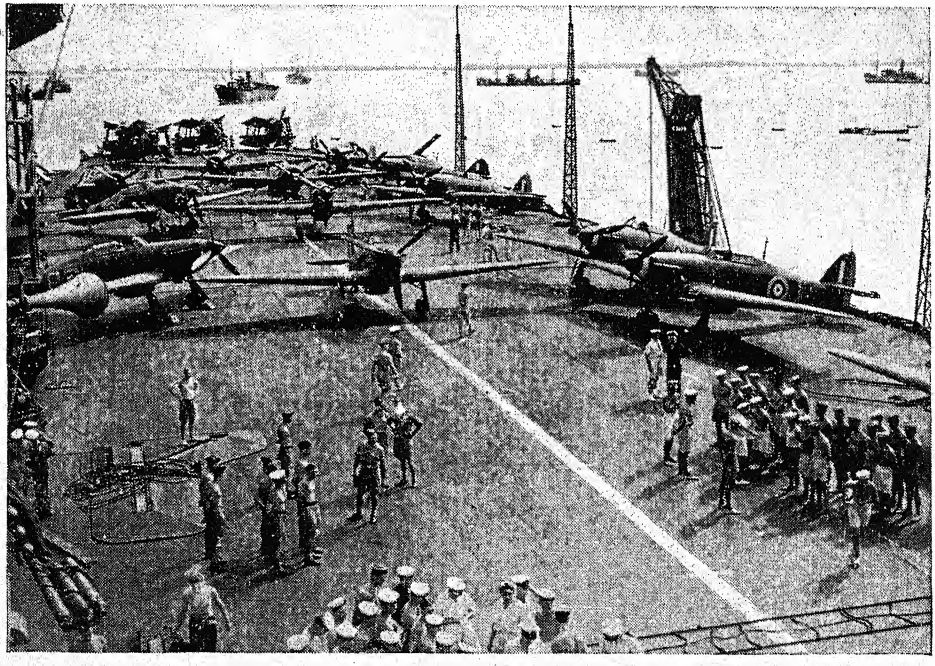
Then find out if the two missing men have by any chance arrived. They may actually be on their way out to the ship. Have they been seen? Has a launch been sent off with them? Hustle around the pier and ask questions. No sign of them? Missed their connexion, probably. All right—what about those local men from the Pool? More telephoning—two men have been found, are being rushed down to the pier. Get a launch ready for them, then. Get the Boarding Officer—let the master know.

Good! That's his winch starting up—he's heaving short. Hullo, here are the two men. Bad luck, lads—but there's a war on! All right, off you go. Telephone Naval Control—tell 'em the ship will be passing the boom exactly an hour and a half late. 'Tell the Extended Defence Officer, so he'll know to keep the gate open. . . .

Phew! There she goes. All right. Through the gate in less than half an hour now. She is through the gate. The convoy has sailed. The Duty Officer of the Naval Control Service puts through his call to the Admiralty, and sends off a signal addressed to all the authorities concerned.

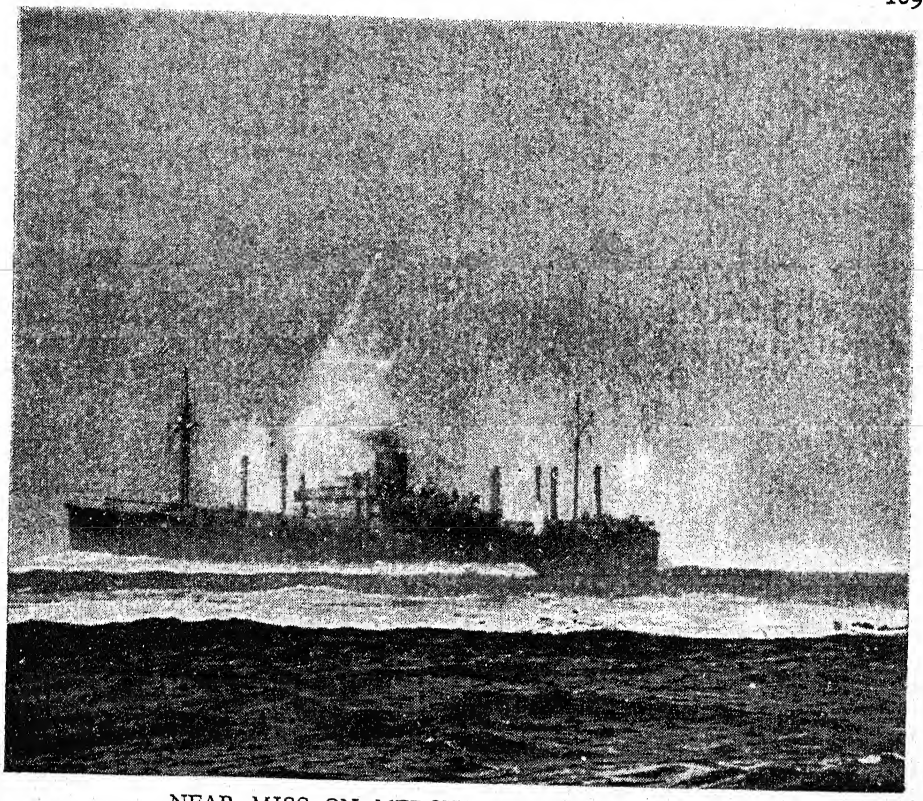
Another convoy has got away. The whole complex organization can relax—for a few hours. It is working at full pressure again very soon; for the convoys sail almost daily, in spite of enemy propaganda and the U-boat blockade.

So Captain John Smith is at sea again. But he cannot relax—not even for a few hours. For every moment that he is at sea



MALTA CONVOY GETS THROUGH

Fighters and torpedo bombers ranged on the flight deck of an aircraft carrier in the harbour of Malta. In the background are ships of the convoy she helped to escort. They reached the fortress with much-needed supplies and reinforcements, in spite of most determined attacks



NEAR MISS ON MERCHANT SHIP IN CONVOY

Dramatic picture of a near miss on a merchant ship, which afterwards reached Malta safely. In the face of massed air, sea and submarine attacks, the object of the convoy—to get stores through to Malta—was attained. The First Lord of the Admiralty sent personal letters to all masters of the merchant ships before they set out on their hazardous voyage

is fraught with danger, and never a day passes without some emergency signal from the commodore, as information comes through of U-boats located in this position or that, U-boats on the prowl.

STAFF WORK

And ashore, there are others who never relax, who are thinking of Captain John Smith and his fellow shipmasters day and night: Fighter Command headquarters, so long as the convoy is within range of fighter protection; Coastal Command, while it can still be reached by long-range patrol aircraft; the staffs at the bases from which the escorts work, operational staffs at the Admiralty, plotting its position, piecing together information about U-boat activity, or about the occasional surface raider, so that the commodore may be warned in good time.

And naval and civilian staffs on the other side, consular officers, shipping agents in neutral ports, are waiting for news, and working so that they will be all ready to receive the ships.

So the vast complex machine of organization works; and Captain John Smith, that simple, good-natured, stolid fellow, is the core round which the whole structure is built. All of us owe him our gratitude and thanks.

UNLOADING CARGO IN THE PORT OF LONDON

From all the seas of the world, in normal times, our merchant ships come with goods of all kinds to the port of London, one of the largest and busiest ports in the world. In prosperous years before the war, the average annual value of London's imports was 470 million pounds. London and Liverpool together handled over half the foreign trade

CHAPTER 6

Sailing the Seven Seas

Great sea roads. World's busiest ocean. Passenger lanes. Billions of bananas. Treasures from Pacific coast. South American trade. Key ports of South Africa. Empire food ships. Short-sea trades. Panama and Suez Canals. Manchester, Kiel, Gota. Sault Sainte Marie. New canals planned. World's aircraft routes. Sky-shipping.

THE Battle of the Atlantic began with the sinking of the liner *Athenia* on September 3, 1939. It spread and became the Battle of the Oceans—a struggle for the maintenance or disruption of the trade routes along which move our foodstuffs and our raw materials; our troops and our war stores.

WORLD'S TRADE ROUTES

In the peaceful summer of 1939 the United Kingdom was the hub of a mighty wheel, from which trade routes radiated over the seas to every part of the world. For routes read cargoes, bearing in mind the many types of ships described in Chapter 3. Certain kinds are built for certain routes, and for this reason, the establishment of a new route often brings on the seas a new type of ship.

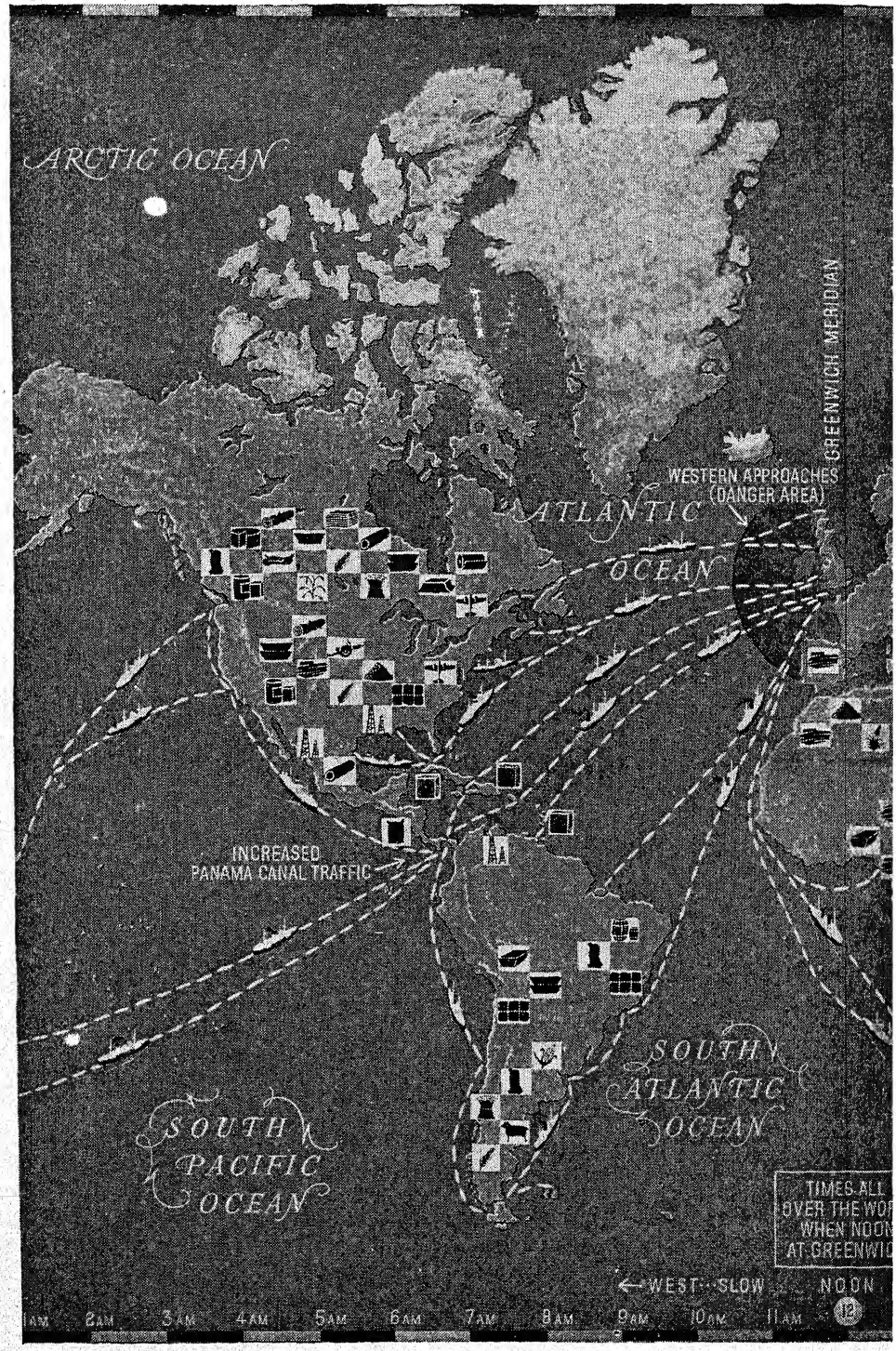
Figs 1 and 2 show the world's principal trade routes in the Atlantic and Pacific oceans. It is on these routes that ships of sixty-seven million gross tons which the world owned in 1939 went about their peaceful business; the Grand Banks trawlers in the North; the whale factories of the Southern seas; the cargo liners of the Atlantic and Pacific; the meat carriers of the South Atlantic; the banana merchantmen of the Caribbean. So let us see how they run, the cargoes they carry, and the ports where they load and discharge. These routes are Britain's lifelines. The world's water spaces, for our investigation, can be divided into two. One takes in the North and South Atlantic Oceans, and the Indian Ocean. The other is the Pacific Ocean.

In both diagrams (Figs. 1 and 2) the intensity of the traffic is depicted by the broadness of the route lines, and it is clear that the North Atlantic route is the busiest in the world. The main routes are from the United Kingdom to North America; from the United Kingdom to Central America and the Caribbean; from the United Kingdom southward to South America, and to the Cape. The North Atlantic services are not only the busiest, but the most subject to severe weather conditions. As a consequence the route taken by ships varies according to whether it is winter or summer.

PASSENGER TRAFFIC

The main trade, say, from Southampton to New York, or New York to Liverpool, concerns passengers and high-class freight, as well as manufactured goods of every kind, from motor cars to typewriters, from machine tools to silk stockings. Much of this merchandise is carried in the holds of large passenger liners. Other goods come in fast cargo liners.

Noteworthy in this important North Atlantic trade, also, are bulk cargoes. These include west-bound quantities of iron ore from the Swedish ore mines, at the top of the Gulf of Bothnia, to the big


ARCTIC OCEAN
GREENWICH MERIDIAN
WESTERN APPROACHES (DANGER AREA)
ATLANTIC OCEAN
INCREASED PANAMA CANAL TRAFFIC
SOUTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
TIMES ALL OVER THE WOR WHEN NOON AT GREENWIC
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NOON
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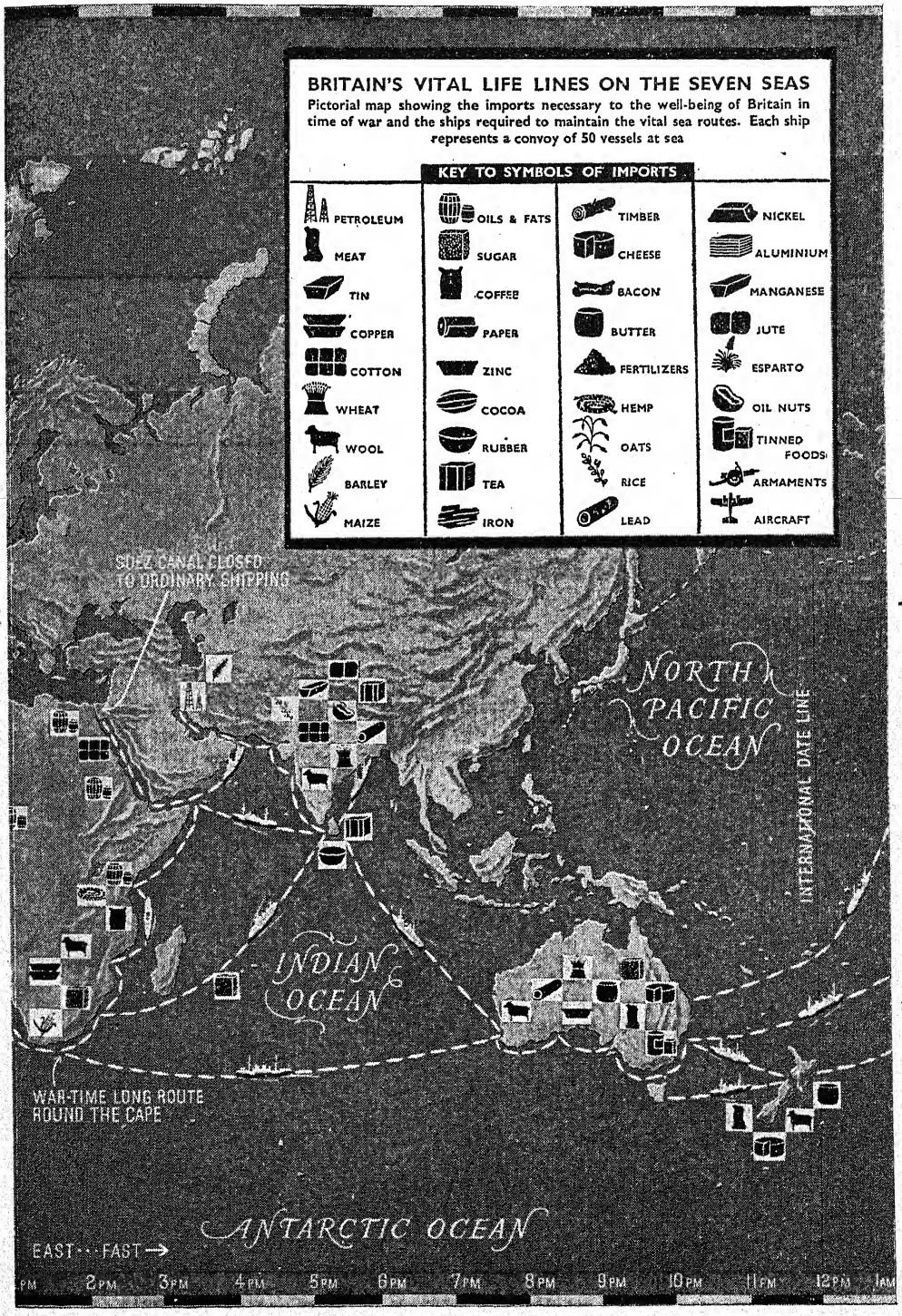
1AM 2AM 3AM 4AM 5AM 6AM 7AM 8AM 9AM 10AM 11AM


BRITAIN'S VITAL LIFE LINES ON THE SEVEN SEAS
Pictorial map showing the imports necessary to the well-being of Britain in time of war and the ships required to maintain the vital sea routes. Each ship represents a convoy of 50 vessels at sea
KEY TO SYMBOLS OF IMPORTS
PETROLEUM
MEAT
TIN
COPPER
COTTON
WHEAT
WOOL
BARLEY
MAIZE
OILS & FATS
SUGAR
COFFEE
PAPER
ZINC
COCOA
RUBBER
TEA
IRON
TIMBER
CHEESE
BACON
BUTTER
FERTILIZERS
HEMP
OATS
RICE
LEAD
NICKEL
ALUMINIUM
MANGANESE
JUTE
ESPARTO
OIL NUTS
TINNED FOODS
ARMAMENTS
AIRCRAFT
SUEZ CANAL CLOSED TO ORDINARY SHIPPING
NORTH PACIFIC OCEAN
INTERNATIONAL DATE LINE
INDIAN OCEAN
WAR-TIME LONG ROUTE ROUND THE CAPE
ANTARCTIC OCEAN
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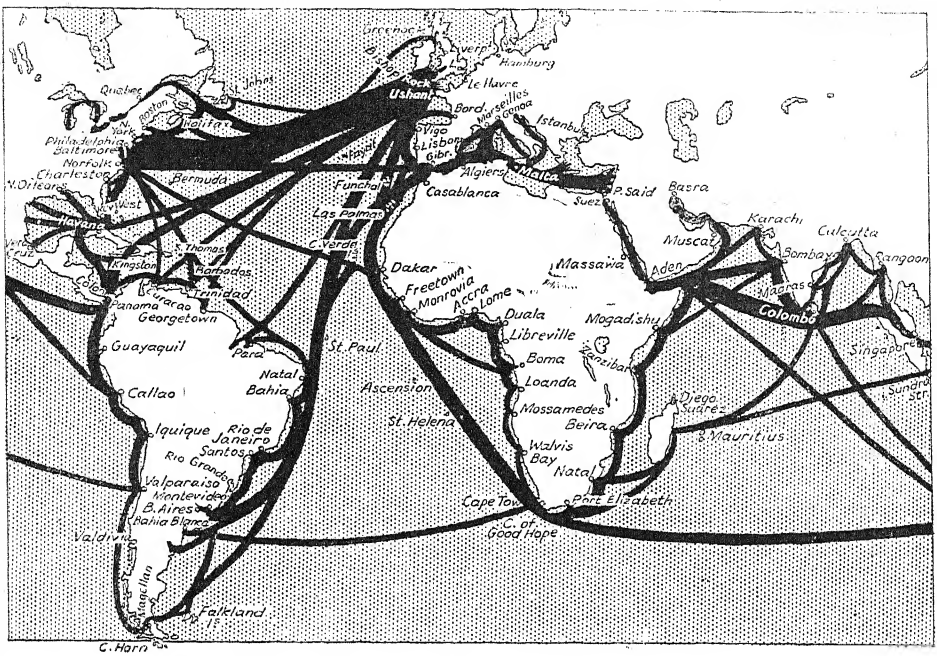


NORTH AND SOUTH ATLANTIC ROUTES

Fig. 1. *The intensity of the traffic along the main trade routes from Great Britain is depicted by the thickness of the black lines, and the map shows clearly that the North Atlantic route is the busiest in the world. Its main trade in peace time comprises passengers, high-class freight, and goods of all kinds. Other important routes are to South America and to the Cape*

Pennsylvania steel works, and east-bound large quantities of grain from the St. Lawrence estuary. The grain comes from the vast growing spaces of the American Middle West, and from the Canadian prairies. During the eight months that the St. Lawrence is open for navigation, that is to say, when it is not blocked by ice, tremendous stores of grain are carried to Europe in ships of the tramp type—British, Norwegian, Greek and other nationalities. The grain is first brought to inland ports like Buffalo, on Lake Erie, one of the enormous sheets of fresh water totalling some ninety-five thousand square miles in area which are a feature of the North American continent. Special types of ships known as lake freighters are employed (Fig. 3) for this vast traffic. In a good year nearly twelve million tons of grain can be brought down the Great Lakes. During the season, Buffalo, to take one example only, receives every week enough golden grain from the western prairies to make almost half a million loaves of bread. This traffic from only one wheat port emphasizes the vital importance of this cargo. Two methods of unloading are shown in Figs. 4 and 5.

Over this broad stream, depicted by the white line on the diagram, the waters of the North Atlantic route, over which millions of tons of valuable merchandise flow annually, are among the most stormy in the world, though there are many trade routes in which distances are greater.

From the Bishop Rock light, a convenient landfall and departure point for ships crossing the Atlantic, to New York is about 2,850 nautical miles. To Boston

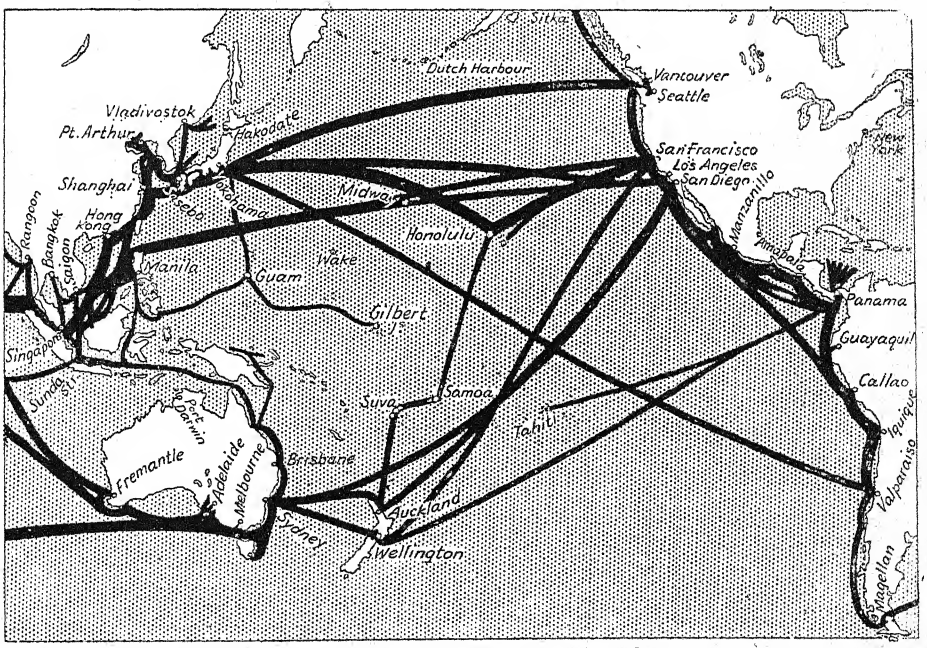
it is 2,650 miles, whilst the run to the St. Lawrence is slightly shorter—a point made much of in travel propaganda before the war for the benefit of passengers fearing sea-sickness.

The North Atlantic is often known as the Western Ocean. The Bishop Rock Lighthouse is a kind of starting-off point to the wastes of the Western Ocean. There some of the routes diverge. Almost equally important trade routes run further south to ports in the Gulf of Mexico, and to the Caribbean Sea. Countries bordering on the Caribbean Sea supply many thousand tons of oil.

The routes to the Caribbean proper are of two kinds: those which terminate in the Caribbean and those which proceed further, via Panama. Here they may divide —first, northward to the Pacific north-west coast ports with their great cargoes of grain, oil, lumber, canned goods and fresh fruit. Other ships turn south to the coastal regions served by ports all the way down as far as Valparaiso. Thirdly, ships sail straight on, across the Pacific to the Antipodes (Fig. 2), Some ships do not call at any of the intermediate islands, but others call at Honolulu, Tahiti, Suva for copra, pineapples, and other products.

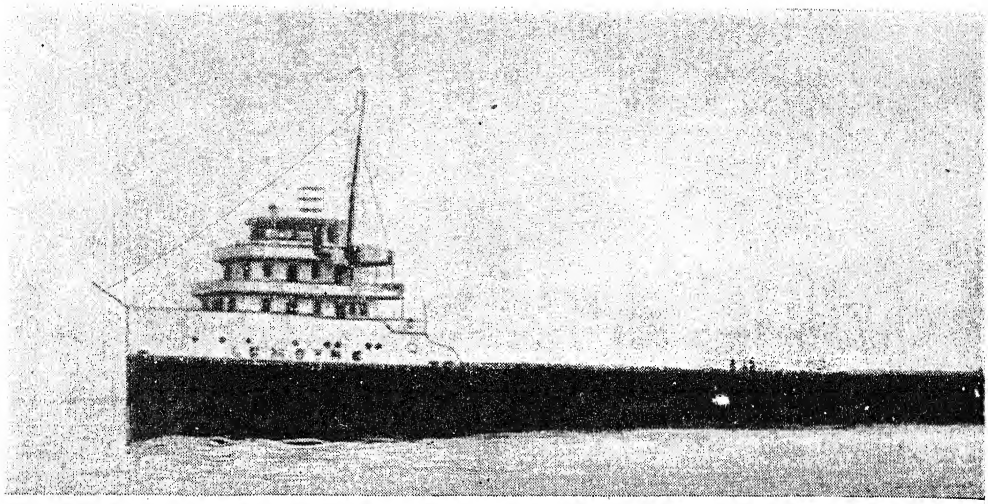
OIL FROM COLOMBIA

Trade to the Caribbean proper is concerned to a great extent with oil, from the Columbia oilfields. In the Gulf of Maracaibo the oil wells themselves are drilled by machines actually on the water of the lake, the oil being taken in small ships at high-water across the Bar leading to the lake, to the refineries on the islands fringing the coast. Curacao is one of the principal islands engaged in this work. In peace time there is an almost continuous stream of tankers, carrying upwards of



SEA ROADS OF THE PACIFIC

Fig. 2. *All main Pacific routes are given in this map, which emphasizes the trade significance of the Panama Canal, connecting the Pacific north-west coast ports with their cargoes of grain, oil, lumber and canned goods. It also links the great group of ports in South America*



MONSTER SHIP IN SERVICE ON THE GREAT LAKES—

Fig. 3. *The "Lemoyne," one of the largest grain ships afloat, is in service on the Great North American lakes, the vast sheets of fresh water which have a total area of 95,000 square miles. In a good year nearly 12,000,000 tons of grain can be brought down the Great Lakes. In one week Buffalo, the inland port on Lake Erie, receives enough golden grain from the*

10,000 tons of cargo at a time, trading to Thameshaven and other big ports in the United Kingdom.

The fruits of the Caribbean, and particularly bananas, are so important as to make an export trade in themselves. Note that whenever a commodity is imported, or manufactured for export in sufficient quantities to demand a special group of ships which do nothing else but carry it, it becomes known as a trade. Thus we talk of the oil trade, the coal trade, the lumber trade, the fruit trade, the grain trade, the ore trade—and banana trade.

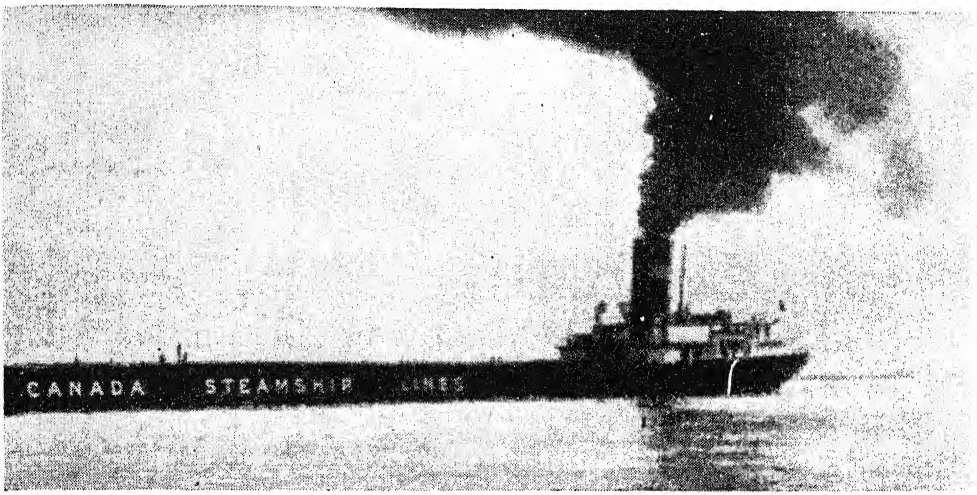
HUGE BANANA TRADE

It has been estimated that the United States consumes well over 6,000 million bananas in a year; even so long ago as 1914 an average of sixty-five bananas per head of the United States population was imported annually. And the European market was very large and expanding rapidly, to satisfy demands from many centres, up to the outbreak of war.

Bananas come from the Central American Republics, from the island of Jamaica, and are exported to the United Kingdom, as well as to the American ports of New Orleans and Boston. Trade in the Caribbean Sea, and in the Gulf of Mexico, was becoming the subject of intense international competition prior to the second World War. It is unfortunate to record that British ships were by no means the most successful traders, the Dutch and German both ranking above them in the type of ships employed.

As for distances: from Bishop Rock to Curacao is 3,800 miles. To Kingston, Jamaica, it is 3,850 miles, to the island of Barbados 3,400 miles, and to New Orleans direct 4,350 miles. To Colon, at the Atlantic entrance to the Panama Canal, it is 4,350 miles.

Of the routes which radiate from Panama, it is convenient, first of all, to consider those running to the Pacific North-West Coast, for although this part of the world strictly comes within the



THE GRAIN-CARRYING VESSEL "LEMOYNE"

western prairies to make half a million loaves of bread. The navigation season lasts eight months only—for four months of the year the St. Lawrence is blocked by ice. British, Greek, and Norwegian ships of the tramp type carry the grain to Europe. The "Lemoyne" can carry 571,000 bushels of wheat. She is 630 feet long, and has a gross tonnage of 10,480

Pacific Ocean, it is naturally linked to the Atlantic for a great deal of its trading.

The opening of the Panama Canal (Fig. 6) automatically opened up a vast volume of trade in the States of California, Washington, and in British Columbia. It also revitalized trade to the Caribbean. The export activity of the Pacific Coast, embracing the Southern California, Northern California, Columbia River, Puget Sound, and British Columbia, is notable for its increase and consistent development. In a single year, ships laden with 11,500,000 tons of raw material and manufactures have sailed from the Pacific Coast to other shores carrying canned, dried and frozen foods, machinery, petroleum and petroleum products, grain, fertilizers, scrap material, textiles, and timber.

The world-famed San Francisco harbour, with its land-locked sea waters, embracing a shore line of 100 miles, has an area of 450 square miles. There are forty-three piers and terminals, giving 17 miles of berthing space, and 186 acres of cargo area, with a capacity of over 2,000,000 tons. San Francisco is just over 8,000 miles away from London, more than 7,000 miles from Liverpool, and 5,262 miles distant from New York, via the Panama Canal. Before the opening of this international waterway, it was necessary to steam all the way down to Cape Horn, through the Straits of Magellan, and up the eastern seaboard.

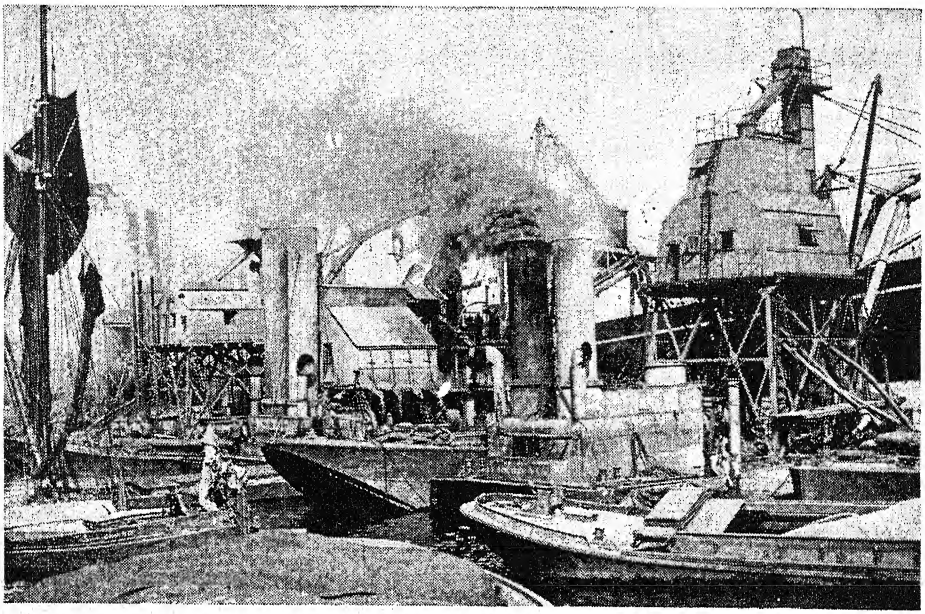
PORTS LINKED BY PANAMA CANAL

The short cut more than halves distance and steaming time. Incidentally, the canal presents all ports on the Pacific Coast seaboard, both Canadian and the United States, with a two-way approach to the ports of South America, and makes it possible for ships starting from, say, Los Angeles to circle the South American continent. It is a shorter distance to Buenos Aires from Los Angeles via the Straits of Magellan than it is via the Panama Canal, the latter distance being

8,406 miles compared with 7,243 miles. Many services actually make the round trip, circling the continent in doing so.

The Panama Canal connects another great group of ports—those in the South American Continent. The ports of Peru, with its ore trade, and Chile, ports like Mollendo, Iquique, Arica and Antofagasta, with open roadsteads in which ships anchor, receiving and discharging their cargo with the aid of lighters. Mollendo is on high cliffs above the Pacific Ocean, and high above these again are the awe-inspiring Andes.

The Tape-line Republic, as Chile is known because of its shape, has a length of about 3,000 miles and a maximum breadth of only about 130. Antofagasta is strung along the coast at the foot of brown uplands; in the slow Pacific rollers and along the rocky shore countless sea lions bask and tumble, and queer diving birds swoop and flash above the surf. It is from these ports that heavily laden ships start out on their long haul back to London or Liverpool via the Panama Canal. On occasions they may go south-about via Cape Horn, touching at some of the chief ports on the River Plate.

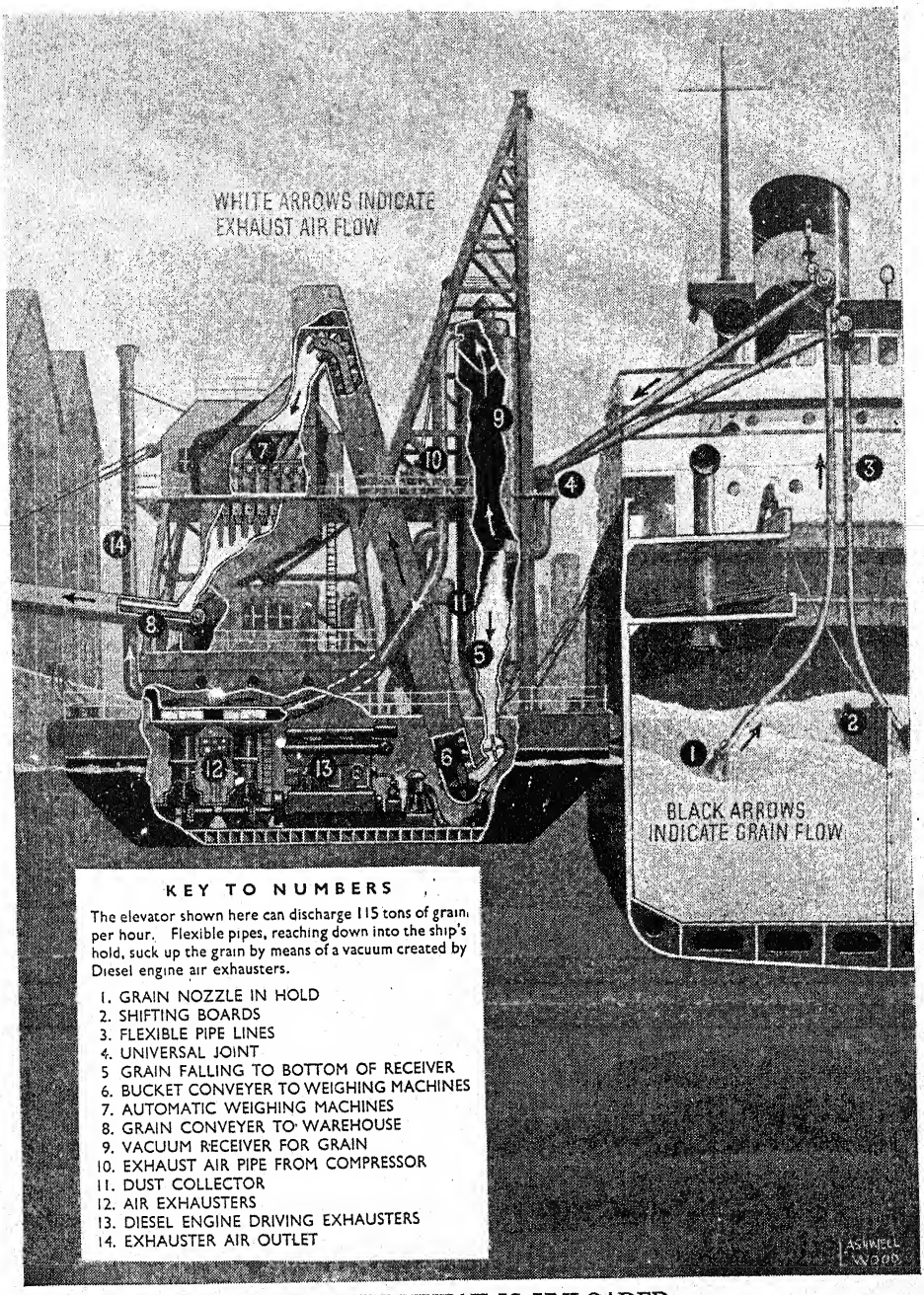


UNLOADING GRAIN BY ELEVATOR

Fig. 4. *Great quantities of grain come from the wide spaces of the American Middle West and from the Canadian prairies. Modern granaries and machines called elevators in Canada and the United States, not only provide safe storage for the grain, but deal with the unloading of it. Grain cannot be handled without creating dust, and as air and dust in certain proportions combine to make a mixture highly liable to explode, precautions are taken against this risk*

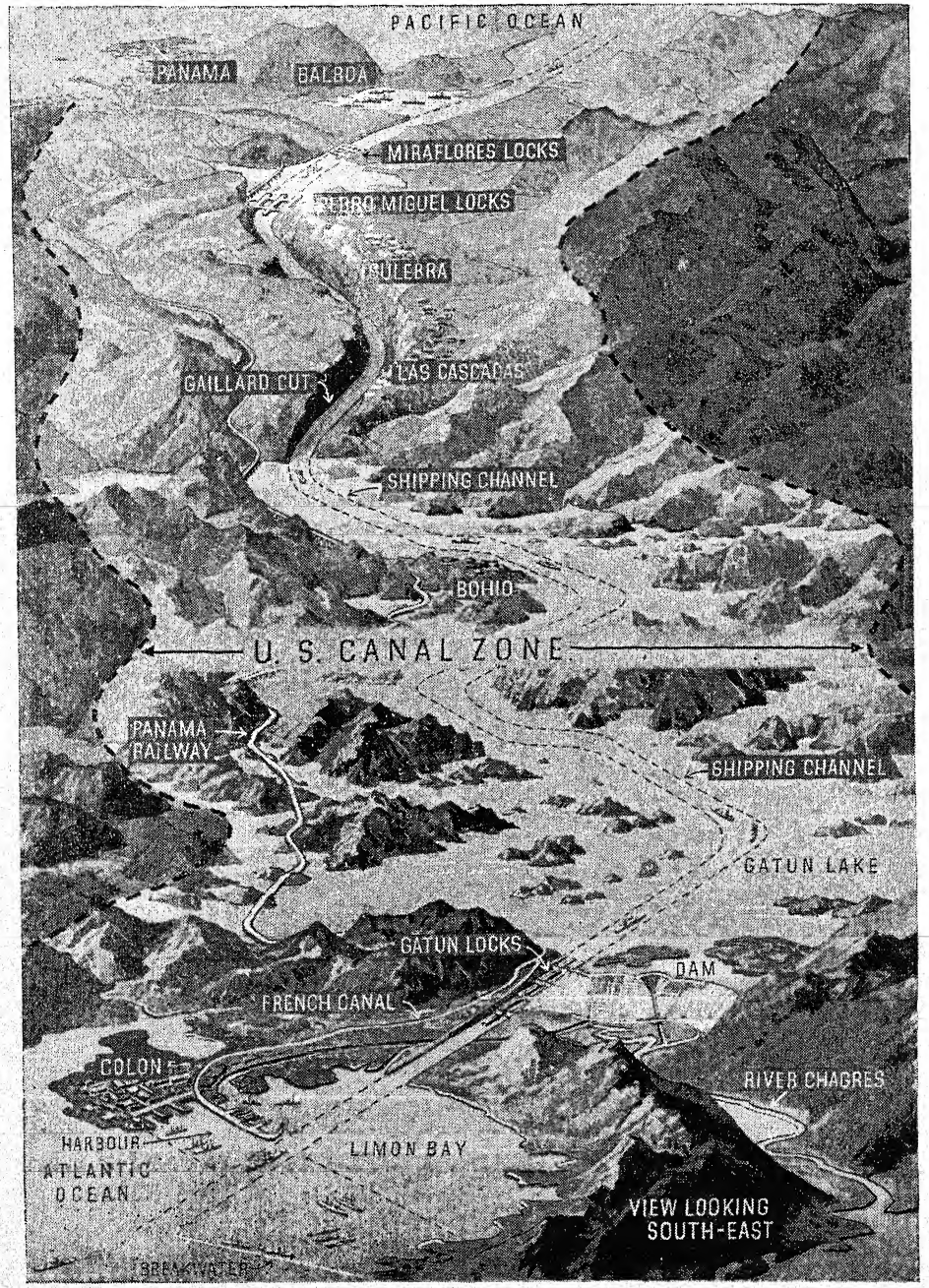
Reference to the map (Fig. 2) shows that the width of the trade lanes from these South American eastern states is rather greater than that of the routes to South Africa, and second only to the broad North Atlantic lanes.

Buenos Aires, and the many inland ports on the River Plate and its associated waterways, are the big granaries and butchers' shops for ever-hungry Europe. It is 5,900 miles from Buenos



HOW THE WHEAT IS UNLOADED

Fig. 5. *Vast quantities of wheat come from Canada and America. Much of this grain, transported by lake freighters, is efficiently handled at the European end by floating grain elevators, which are sometimes moored between ship and warehouse, or barge, and work by suction*



LINKING THE ATLANTIC AND THE PACIFIC

Fig. 6. *With the completion of the Panama Canal in 1914, a vast volume of trade was opened up. Forty-three miles long, the Canal is a vital waterway in the world's commerce*

Aires to Ushant, which is the landfall light for ships coming in from the southward, loaded with grain or meat, or rubber, or coffee from Brazil.

The grain trade from the River Plate is of international importance; it yearly absorbs thousands of tons of ships of the tramp type. They are mostly chartered for one, two, or more voyages at the Baltic Exchange in London.

These ships may proceed to an anchorage at the mouth of the River Plate in ballast, or they may, perhaps, bring a cargo of coal or of general nature.

SHIPS FOR SOUTH AMERICA

Some of the main outward shipments to Brazil and the Argentine are large manufactured goods, such as electric power plant, railway coaches and locomotives. Another important export from Europe to South America, which generally comes under its own power, is the completed ship. The rivers Parana and Paraguay, which discharge into the triangular muddy delta known as the River Plate, carry an enormous amount of traffic, and some of the ships transporting freight and passengers go so far inland that at their terminal they are nearer to the Pacific than to the Atlantic Ocean. The River Plate junction of the Rivers Parana and Uruguay is a shallow estuary draining a basin nearly 4,000,000 square kilometres in area. The Plate itself is about 150 miles long.

Most of these ships are built in Europe, many of them in Great Britain. Their design, whilst specialized, is based upon the design of seagoing ships, and they make the journey out from their builders' ports under their own power. One company alone owns 360 passenger and cargo motor ships, steamers, barges, tugs and cattle carriers.

But it is not only with Europe that South America does so much trading. The routes between South and North America have developed enormously in importance in recent years, and prior to the outbreak of war between Japan and America a regular service was maintained with ships of high speed and quality.

It is 3,610 miles from Montevideo to Cape Town, or about sixteen days steaming at the old-fashioned tramp ship speed of ten knots—a time which can be cut to just over nine days in a modern 18-knot ship.

Cape Town is the leading port of South Africa, and one of the most important ports in the Empire. The citizens of Cape Town realized its possibilities, and had on the eve of the second World War plans which would have made Cape Town not only the most up-to-date bunkering station in the world, but also the best equipped to deal with a variety of freight, both through cargoes and transit cargoes. In 1937 Cape Town handled nearly £22,000,000 worth of imports such as textiles, apparel, yarns and fibres, iron and steel goods, and foodstuffs. Exports were valued at over £92,000,000, and these included gold, diamonds, fruit, maize and fish.

IMPORTANCE OF CAPE TOWN

Cape Town is the terminal of a most important trade route from Great Britain. Cape Town reached its highest prosperity when the coal-firing of ships was at its peak and the emigrant trade to Australia was a matter of great importance.

The increasing use of oil as a marine fuel meant that the rich deposits of coal to be found in Natal were no longer necessary for bunker purposes for long-distance passenger liners, and so the importance of the Cape lessened. Unsettled conditions, and the fact that the modern oil-using ship could go much farther than her predecessor without bunkering, made it just as convenient for shipowners to use the southern route in preference to Suez.

To secure speed in bunkering modern oil-using ships, the oil companies put up installations which were equal to anything in the world. Cape Town followed by constructing dry docks and increasing its harbour area, and adopted a plan for a new port with no less than three miles of quays and a water area of over 360 acres.

KEY PORTS OF SOUTH AFRICA

Like the harbours of the Pacific North-West Coast, Cape Town is a port which, whatever the future may bring, cannot fail to grow, and the same is true of other key ports of the Union: Port Elizabeth, East London, and Durban. One of the principal connexions is with the United Kingdom, the distance from London to Cape Town being 6,181 miles, or 5,978 miles from Southampton, which is the usual terminal port for the mail ships. Generally, these big 23,000-ton vessels make an intermediate call at Madeira, 1,306 miles from Southampton.

Madeira and the Canary Islands are interesting and important calls on the routes both south to the Cape, south-west to South America, and to the west coast of Africa. They carry on a large trade, principally in fruit and vegetables, and several lines of ships are employed, especially in the trade between these islands and the United Kingdom. Norway had a large stake in this business before the outbreak of the second World War.

Rich and valuable cargoes are carried home from the African western seaboard. Not the least important among them are vegetable oils and ground nuts, which form the basis of such a valuable foodstuff as margarine.

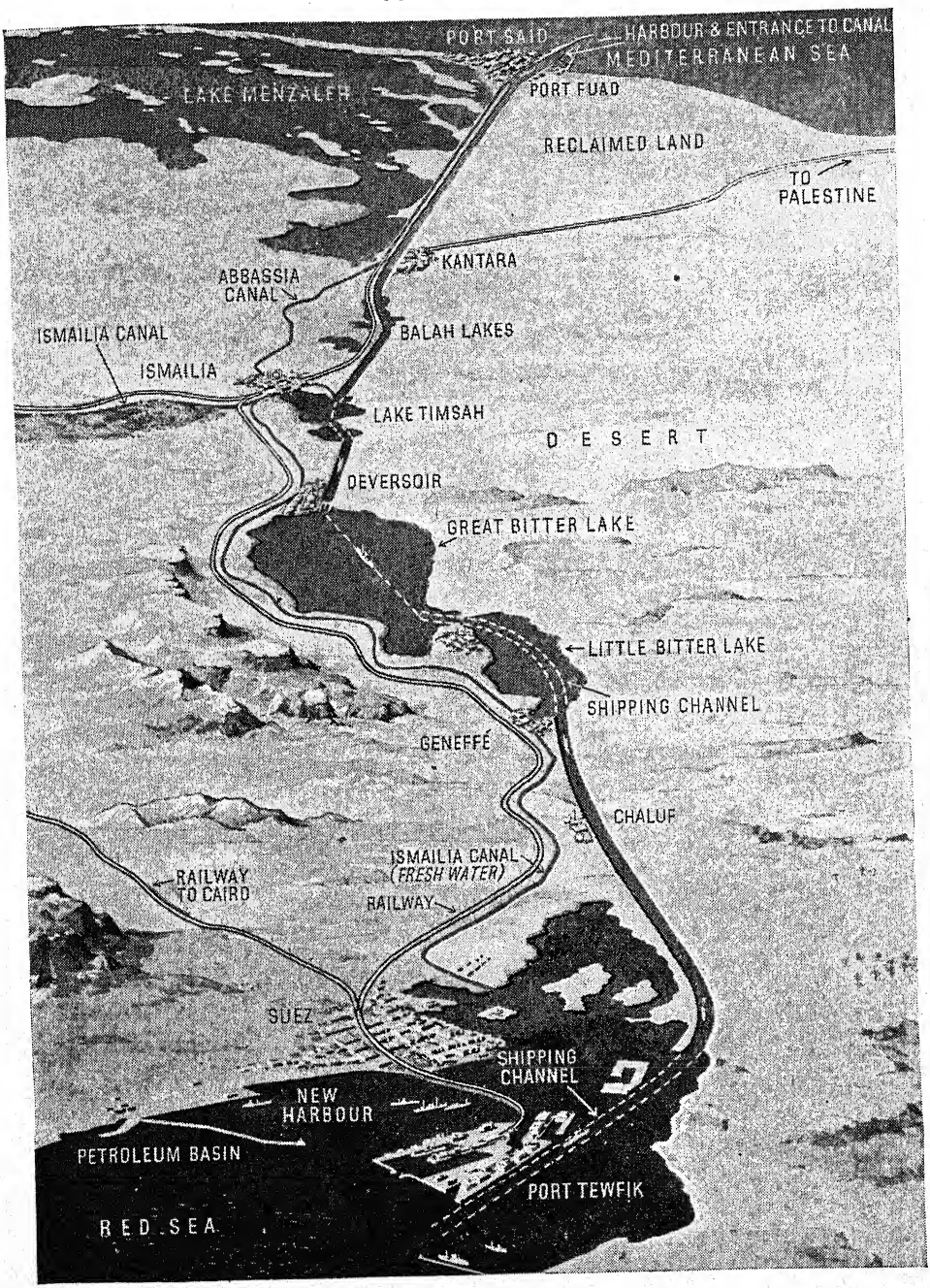
Just as the name Union Castle—one of whose fine ships is illustrated in Chapter 3—will always be associated with the South African trade, so the name of the Elder Dempster Line is bound up with West African shipping. The Union Castle ships girdle the African continent, for some of their vessels run out to Gibraltar, then proceed on through the Mediterranean, down the Red Sea, and down the African eastern seaboard. At all ports, from Zanzibar downwards they make contact with ships which cross the Indian Ocean.

Before Japan joined in the second World War, the link between South Africa and the Far East was becoming stronger. The Dutch had a great deal to do with this, and the vessels they constructed were in no small way responsible for the success of these developments. Some of the most luxurious passenger ships in the world, with ample cargo accommodation, were built to connect Cape Town with Hong Kong by numerous island ports and via Colombo, Singapore, Saigon, and other important trading centres; they could hardly be equalled on any route for luxury and good service.

DOMINION TRADE

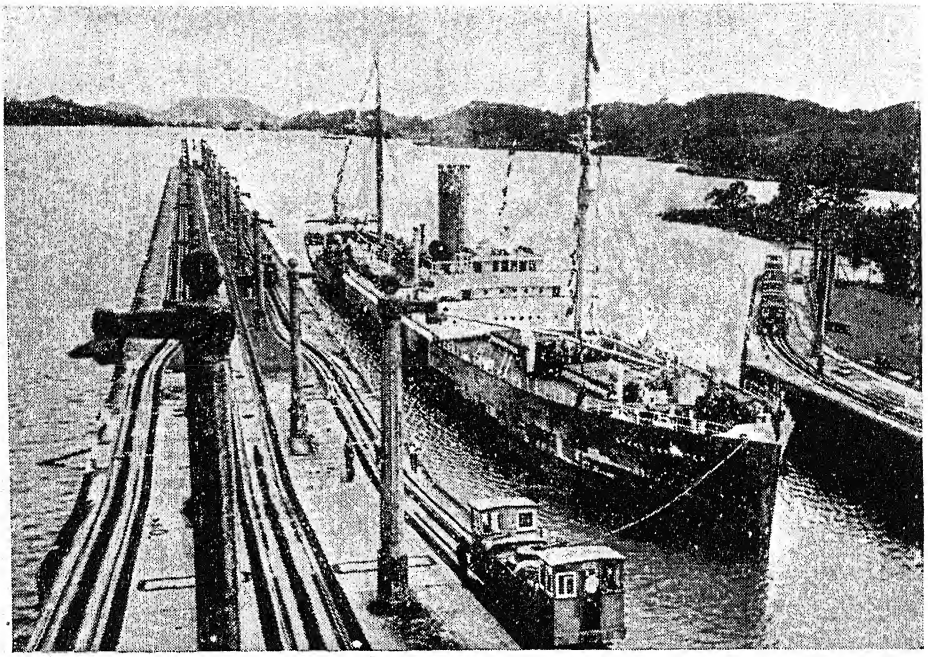
The more one examines the map of the Atlantic Ocean, the more one is convinced of the strategic position of Cape Town. And so, using it as a jumping-off point, we move on to Australia, which sends us wheat and meat, and fruit and dairy produce, as does also the sister Dominion, New Zealand. Ships have, for a long time, been accustomed to go to Australia either by the Cape, with the long haul to Fremantle, and then round the Australian coast, or via the Suez Canal and then straight down to Fremantle, or on occasion via the South Atlantic Ocean and Cape Horn. The more general way out and home for British ships trading to New Zealand—the Empire food ships—is via the Panama Canal and the Pacific Ocean.

Distances are long, so speed is of paramount importance. From Panama to Wellington, New Zealand, is 6,500 miles. Six thousand miles at the old-fashioned 10-knot speed takes twenty-five days. Imagine, therefore, the advantages of a



BRITAIN'S GATEWAY TO THE EAST

Fig. 7. *The Suez Canal consists of four lakes linked together by channels dredged out of the sand. Ships carry 26,578,000 tons of cargo through the canal in a typical year*



PEDRO MIGUEL LOCK, PANAMA CANAL

Bound from Los Angeles to London with 7,850 tons of general cargo, mostly canned goods and dried fruit from California, the "Steel Exporter" enters Pedro Miguel lock. This ship was the 100,000th ocean-going commercial vessel to pass through the Panama Canal

19-knot ship, which can cut this time to thirteen days, particularly when the valuable and fragile nature of the cargo carried is considered.

Trade in the Pacific has been rapidly growing for some years, and so has the speed and equipment of the ships.

EMPIRE FOOD SHIPS

Not only is the Inter-Empire trade between Australia and New Zealand of the utmost importance, but the sister Dominions' trade with the Pacific north-west coast is growing. Special ships are constructed to run from Sydney via New Zealand, to Los Angeles, and then up the coast to Puget Sound ports. One of the principal links, and a growing one for meat, fruit, dairy produce, and lumber is that between Panama and New Zealand. In 1938 the British Empire celebrated the diamond jubilee of the immense overseas meat trade, recalling that a little Glasgow steamer, *Strathleven*, sailing from Sydney with forty tons of meat on board, played an historic pioneer part. This forty tons of beef and mutton was frozen on board.

Chilled beef is another important cargo in the Empire food ships, and in 1937, 350,000 quarters were shipped. Shipments of pigs, which in 1933 amounted to 70,500 carcases, had grown to nearly a quarter of a million in 1937. For these increasing quantities of foodstuffs the ships built and building before the second World War, and the routes on which they operated were of great importance.

This concludes the survey of the principal long-distance trade routes, especially as they affect Great Britain.

Mention must now be made of the busy trades which are maintained in peace time

between the United Kingdom and ports in the Western Mediterranean and in the Levant. Whilst increasing quantities of our fresh fruit came from New Zealand ports, much was provided from the Levant and Spanish ports, particularly oranges and lemons.

The shorter haul has many advantages, because there is no need for refrigeration; surface ventilation is sufficient.

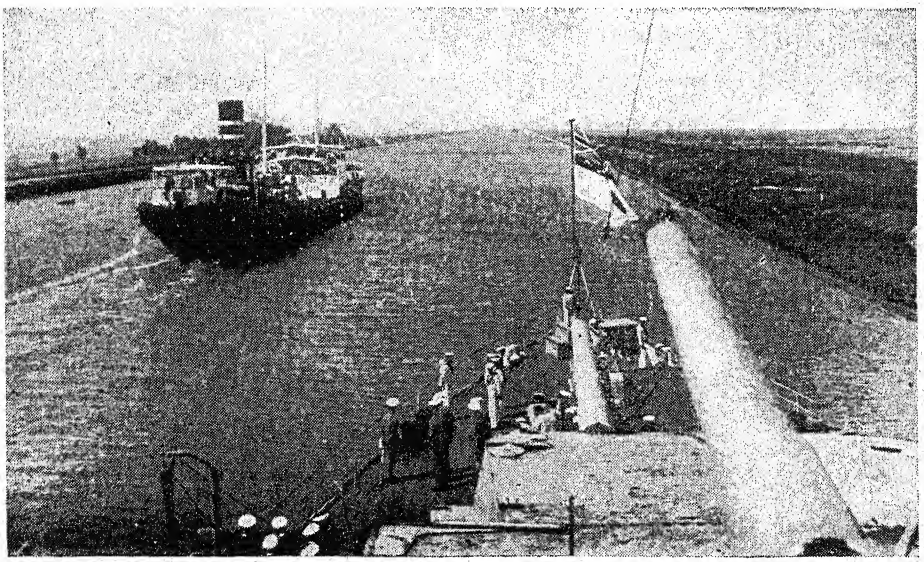
SHORT-SEA TRADES

Nearer the British Isles there are the short-sea trades, the coastal routes which surround the British Isles, carrying much trans-shipment freight from the ships running on the long Empire hauls, as well as cargo in competition with the railways and the roads. The North Sea and English Channel are crossed and criss-crossed with routes in peace time. For pit props from the Baltic countries form an exchange cargo for coal and coke; Denmark sends fish and dairy produce; Holland sells us eggs and fresh vegetables. We send coal to Holland.

The routes to the Baltic are among the most important in Northern Europe. There are two ways of reaching the Baltic: one is north-about, via the Skagerrak and Kattegat, down to the Sound, round the south of Sweden and up into the Gulf of Bothnia. The other is along the flat Frisian coast to Brunsbuttel at the North Sea entrance to the Kiel Canal, and thence to Holtenau, at the other entrance.

The Kiel Canal, which is one of the most important strategic waterways in the world, is in peace time one of its most important trade lanes, since there is a great saving in distance for ships bound for the English Channel, if they pass through the Kiel Canal instead of going down the Kattegat and through the Sound.

Ship canals have a very considerable influence upon the trade routes of the



MERCHANTMAN AND WARSHIP, SUEZ CANAL

The "British Courage" steams past one of H.M. ships in the Suez Canal, which was opened for navigation in 1869. The Suez Canal has no locks, and the average time for merchant ships to pass through is 15 hours, 20 minutes. Its terminal ports are Port Said and Suez

PANAMA AND SUEZ CANALS

Opened for navigation	Panama Canal, 1914 (August 15)	Suez Canal, 1869
Connects	Atlantic and Pacific	Mediterranean and Red Sea
Ports at each end	Colon (Cristobal) Panama (Balboa)	Port Said, Suez (Port Tewfik)
Length	43.84 nautical miles	85 nautical miles
Number of locks	Three	None.
Depth of Channel	57 feet for all sections	30 feet (maximum draught of ship)
Width of Channel	300 feet minimum	240 feet minimum
Approximate average time of transit for ordinary merchant ships	8 hours	15 hours, 20 minutes.

world. Most important of the world's ship canals are Panama and Suez. Running them very close in importance, and exceeding in an eight months operated year the volume of traffic both carry, is the Sault Sainte Marie Canal on the Great Lakes of North America, which connects Lakes Superior and Huron, and overcomes the 21-foot difference in levels between them. It is popularly known as the Soo Canal (see Table).

In addition to the Kiel Canal, there are the North Sea Canal, connecting the important port of Amsterdam with open water at Yjmuiden, the Manchester Ship Canal, which performs a similar function for the port of Manchester as far as the River Mersey is concerned, and a much smaller canal, the Gota Canal, which is serviceable to ships of coaster type; it links Stockholm with Gothenberg, and runs across the Swedish peninsula.

But to return to the Panama Canal; it is one of the engineering wonders of the world.

It connects the Atlantic and Pacific Oceans by means of two bays, an artificial lake 164 square miles in extent, and a natural lake. There are three systems of locks. Contrary to the general impression, its direction is from north-west to south-east, i.e., almost at right angles to the strip of land it crosses. Passage from the Atlantic to the Gatun, a great artificial lake, is

CANAL TRAFFIC COMPARISONS IN A TYPICAL YEAR

	Panamá	Suez	Sault Sainte Marie (Soo)
Number of transits	4,673	5,337	21,975
Net tonnage	22,855,151	26,761,735	68,546,412
Tons of cargo	23,958,826	26,578,000	91,379,658
Total: Panama and Suez	50,536,826		—
Total dues paid	$119,203,342	Fr. 193,515,145	Nil. Free canal
Period of operation	12 months	12 months	8 months

made in the three steps of the Gatun locks; the descent from Gatun Lake to the Pacific is made by one step on the Pedro Miguel Lock, the Miraflores Lake, and two steps in the Miraflores Lock. All the locks are double, so that there can be a two-directional flow of ships.

It is instructive to compare the Panama and Suez Canals physically. Other interesting comparisons—length and transit time—are made in the tables opposite.

Suez is dead flat throughout its length. Panama requires a lift of 85 feet and a drop of 31 feet, followed by a second drop to sea level. The construction of Panama involved literally digging through a large mass of land, and the creation of a system of locks. The building of the other involved the linking up of a system of lakes. Both canals have the same function: to save mileage on seaways. Each handles a great volume of traffic. The Suez Canal has no locks throughout its eighty-five nautical miles of length. It comprises a string of lakes which are linked together by channels dredged out of the sand.

LAKE FREIGHTERS ON SOO CANAL

Special types of ships, lake freighters, bring grain and ore over the Great Lakes of North America to inland ports. The Sault Sainte Marie Canal (the Soo), operating only eight months of the year, carries a greater volume of traffic than the Suez and Panama together

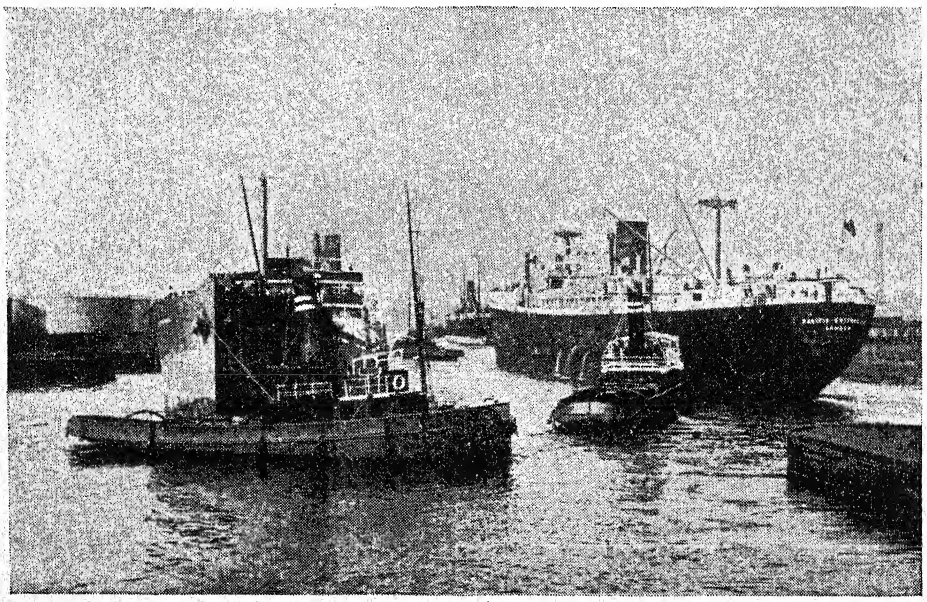
The canal channel is banked up throughout most of its length, so as to form a secure waterway for ships of up to 32-foot draft. Differing vitally though each does from the other from a physical point of view, each cuts in half the land masses of its respective hemispheres. Suez revitalized a large inland sea—the

Mediterranean—and made of it, in railway parlance, a through station; formerly it had been a terminus. Panama did the same for the Caribbean. Events have caught up with Suez, and thanks to the low fuel consumption of the modern ship, it was, prior to September, 1939, no longer necessary for vessels to pass through this canal and down the Red Sea on the way to the Antipodes, and even to the Far East. The importance of Cape Town is again emphasized.

Political events have left Panama more or less untouched. Modern machinery permits ships to go via Magellan rather than via Panama if necessary, but Panama is still the short cut to the Antipodes from the United Kingdom, and effects a great saving in sea miles from chief ports of Europe to important Pacific ports. The two principal ship canals in the world are in a category by themselves. Dividing continents, Panama and Suez link oceans; Kiel cuts an isthmus and joins vital seas. Located at the narrowest land portion of the continents, the construction of Panama and Suez was carried out in the teeth of unbelievable difficulties—Suez because civil engineering was a young science in those days, and Panama because of the contour of the land. It took ten years to construct.

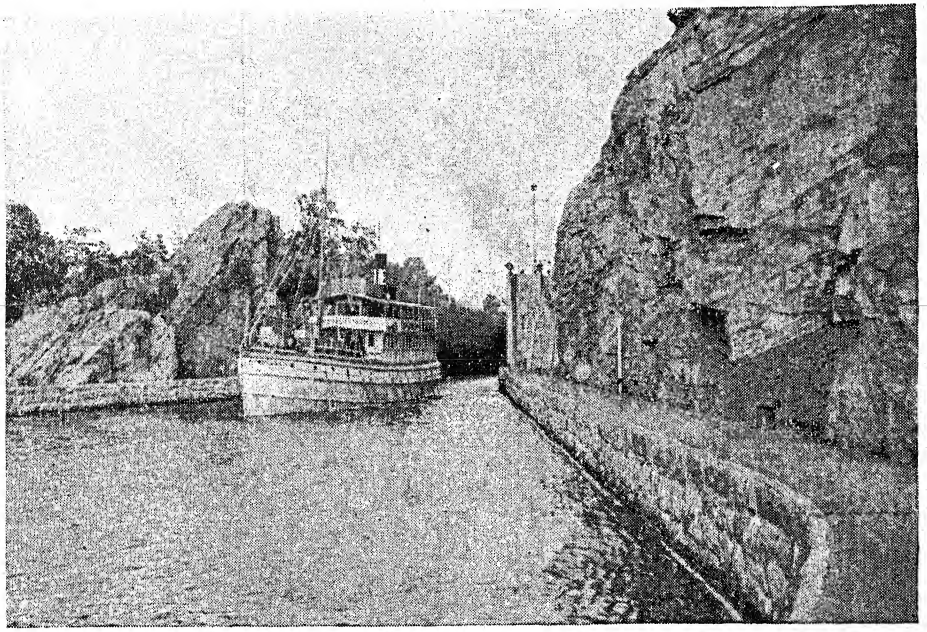
NEW CANALS PROJECTED

There has been some talk of a rival to the Panama Canal via Lake Nicaragua. Before the Panama Canal was built, the Nicaraguan route was strongly advocated. Also Siam has considered the building of a canal across the Kra Isthmus, joining the South China Sea and the Bay of Bengal. The Kra Isthmus, which is a narrow neck of land ten miles wide, links the Malay Peninsula to Tenasserim.



MANCHESTER SHIP CANAL

Built at a cost of £15,000,000, the Manchester Ship Canal transformed Manchester from an inland city into one of the leading ports of Great Britain, with an immense annual revenue. Great difficulties had to be overcome during its construction. Picture shows the "Pacific Enterprise," with tugs, passing through the canal, which is thirty-five miles long



RIVERS AND LAKES SERVE THE GOTA CANAL

Linking the Baltic with the Kattegat, the Gota Canal is 240 miles long, but only about fifty-six miles consist of artificial canals, the remainder being rivers and lakes. The differences in level along the route are regulated by seventy locks. Above, a ship leaving Trollhättan Lock

It is extremely doubtful, however, if the canal would be feasible, owing to the mountainous terrain, though modern engineering is not necessarily baffled by such difficulites.

From a traffic point of view, more impressive than either the Panama Canal or the Suez Canal is the Soo Canal. It links two large freshwater seas and is a vital point in the through flow of grain and iron ore from west to east. Through this narrow bottle-neck pass in an average navigation year of eight months, nearly 22,000 ships with over 91,000,000 tons of freight.

Two other canals are the Manchester Ship Canal, 35½ miles in length, and the North Sea Canal, 15 miles in length. The North Sea Canal is as clean as the Manchester Ship Canal is dirty, and it is joined at certain points by tributary canals, which are all part of the Dutch Inland Waterways system. Indeed, the whole of Holland, and of Northern Europe is one vast canal system, upon which large quantities of freight are annually moved. These canals are convenient substitutes for road and railway, and are not part of the world's main trade routes.

The Gota Canal is a 240 mile river and lake route, partly canalized, connecting Gothenberg with Stockholm. It is not a ship canal in the accepted sense, as it does not handle ocean- or sea-going tonnage, and actually only fifty-six miles are canalized, the remainder being a channel through lakes. Part of this canal—the Trollhättan portion—handles sea-going traffic. In 1938 over 2,500,000 tons of freight passed through. The largest cargo was 2,000 tons of iron ore, another example of the growing importance of inland water transport.

In ships specially designed for the work the canal transports considerable quantities of merchandise, and in the summer months has a large tourist traffic.

There are differences of level of 300 feet on the canal route, and these are overcome by means of no less than seventy locks at various points.

Thus we realise why there is a tendency these days to produce small, fast, highly efficient ships. These are ideally suited to canal traffic. Indeed, the production of ships capable of carrying merchandise at high speed on rivers, canals and seas is certain to be one of the developments of the future.

It may be asked: What is going to be the effect of aircraft on the ships and routes of the future? It is instructive to examine a map specially prepared to show the number and direction of aircraft routes which were in regular use in September, 1939 (Fig. 8).

These show clearly the similarity between air and sea routes, at any rate, as far as the terminal ports are concerned. The map indicates, too, that pre-war air routes were successfully operating

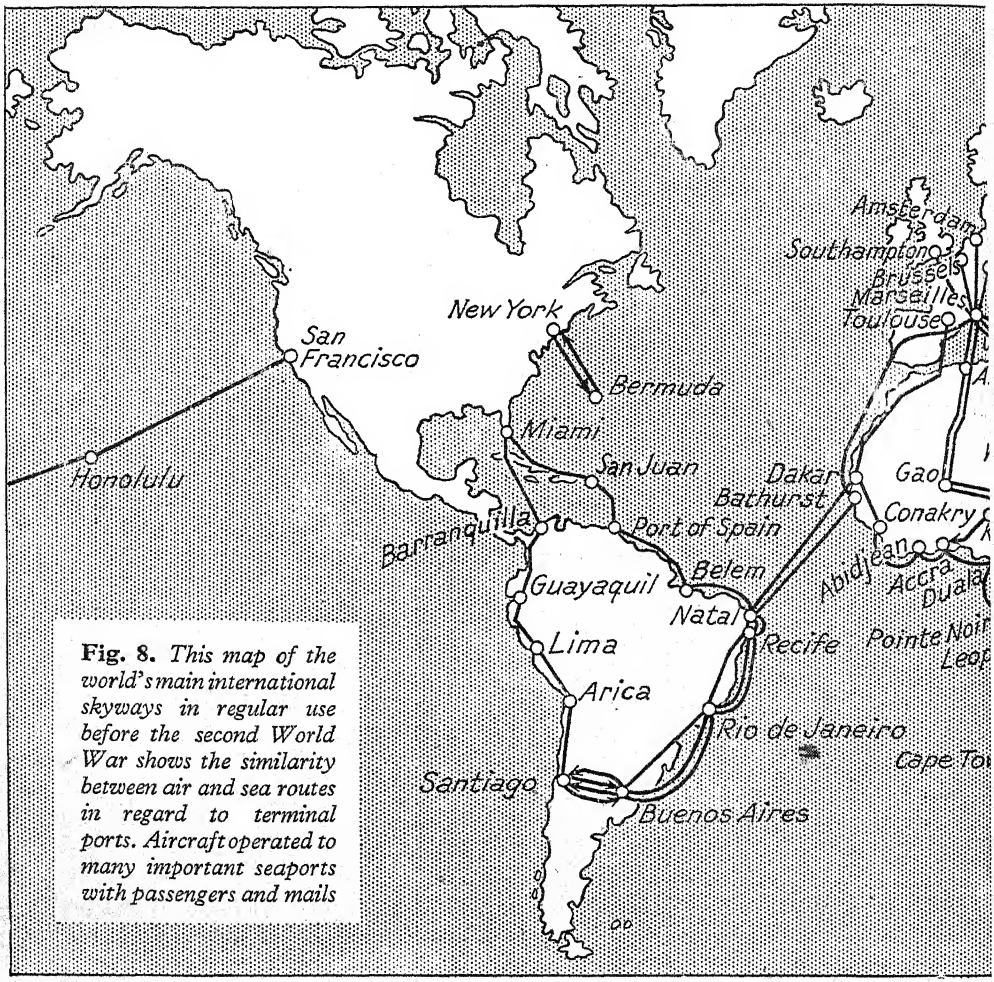
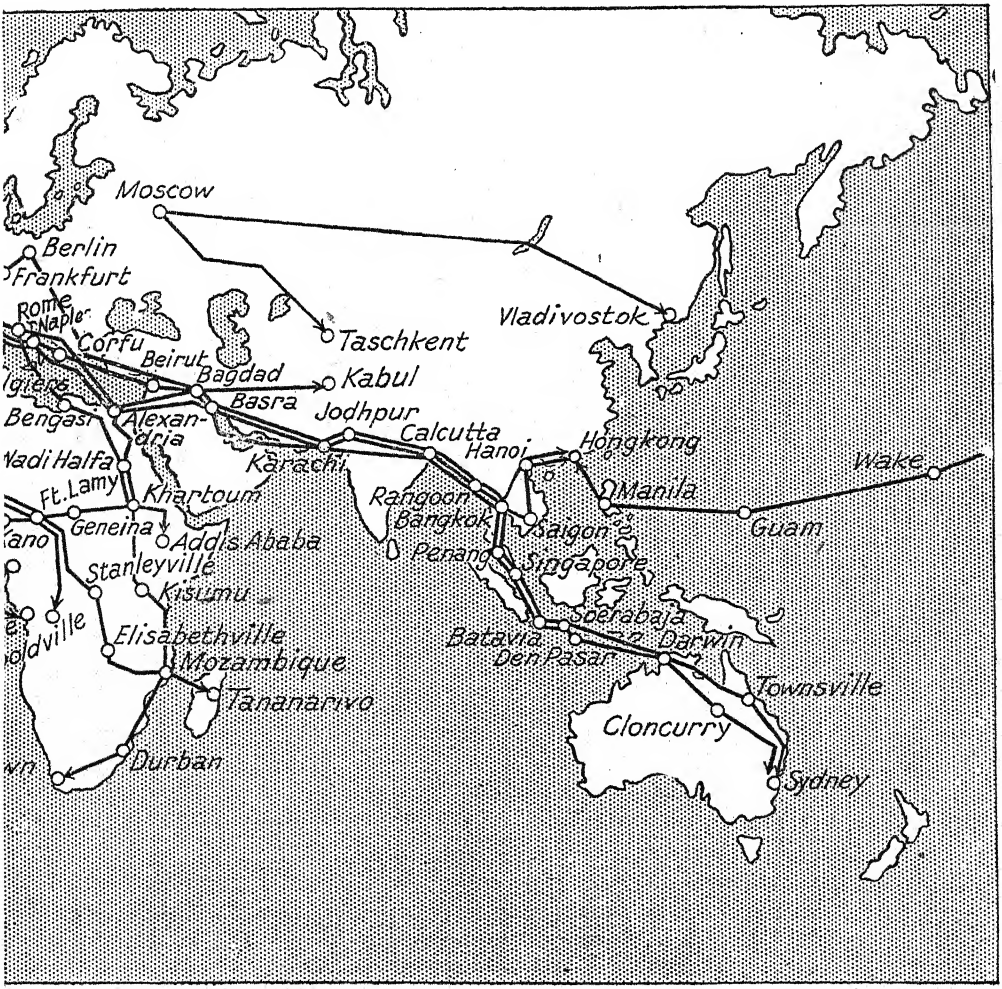


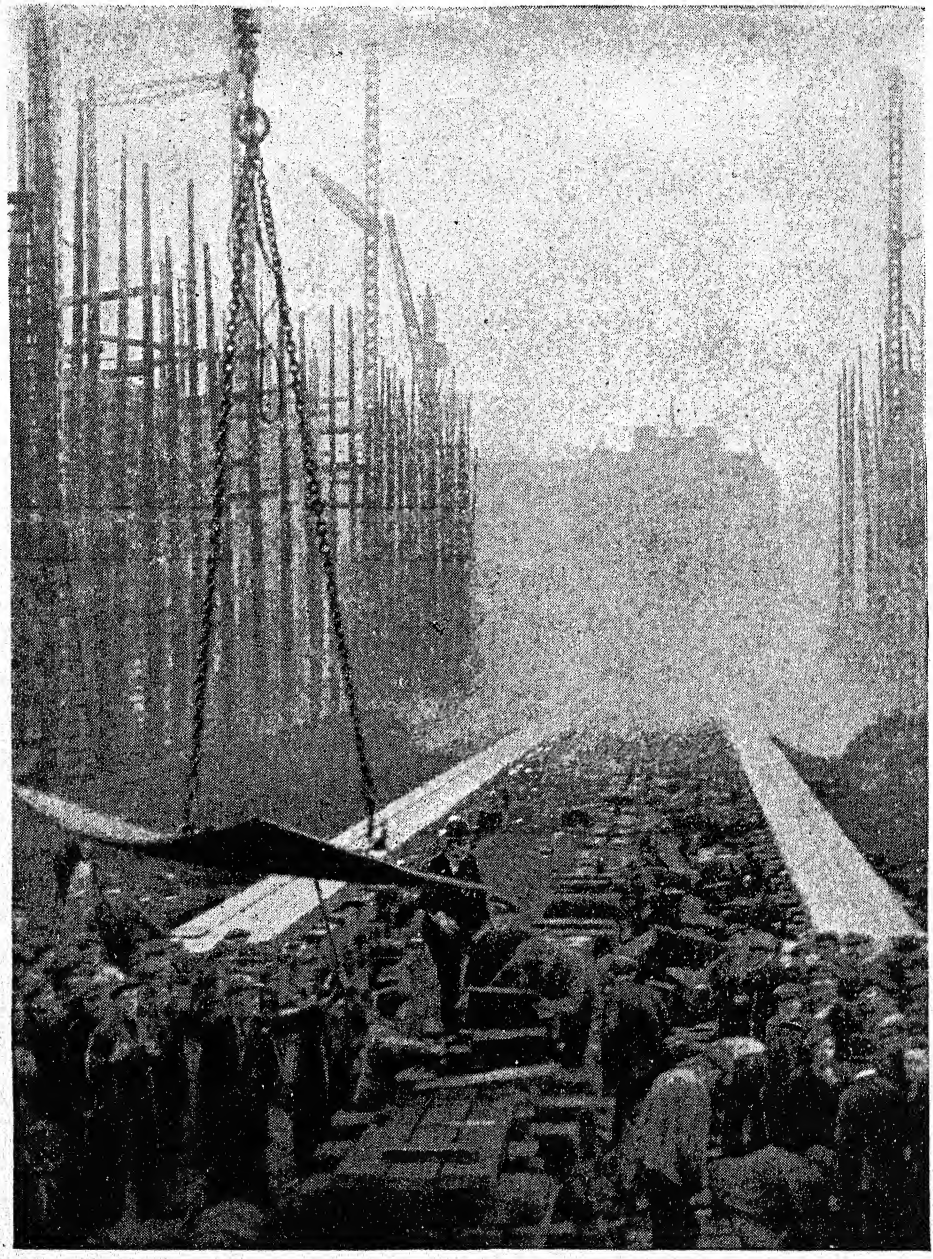
Fig. 8. *This map of the world's main international skyways in regular use before the second World War shows the similarity between air and sea routes in regard to terminal ports. Aircraft operated to many important seaports with passengers and mails*

to the most important of the world's seaports with passengers and mails.

The use of aircraft—call it sky-shipping—will increase. The question is: how much will the routes be sea routes, i.e., with flying-boats, and how much will they be land routes, spanning the seas and oceans merely as part of their regular flight? One thing is certain. Development will depend very largely upon ready supplies of oil. That is why the most enduring trade is that which carries liquid fuel on the trade routes. Because of this Cape Town has come into its own again as a world port. Here, again, we stand at the threshold of big developments.

That aircraft, the heaviest liquid fuel user, will completely eliminate the ship is unthinkable; that aircraft will affect the design and operation of ships is likely. That aircraft will alter the direction of trade lanes does not seem possible, because these are established with regard to the optimum distance between ports with regard to weather conditions. What is at least certain is that ships will be faster and that the time taken between ports will be very considerably reduced.





NON-STOP SHIPBUILDING

The shipyards of Great Britain responded magnificently to the vital need for ships. This newly launched tanker can be seen about to enter the water. Before she had left the slipway the keel plate of the next vessel for construction was being slung into position. The men stopped work only to cheer the launching, and started immediately upon building another ship

CHAPTER 7

Shipbuilding and Repairing

Strain on Britain's shipping. Serious losses and a gain: past lessons neglected. Seven standard types of ships. Pre-fabrication. New ships in record time. The glory of a new ship. "Surgeons" for sick ships. Ships torn in half. Liner into cruiser. Triumphs of the salvage service.

ONLY after about two and a half years of war—intermittent on land and in the air, but continuous at sea—did the fact of Britain's sea dependence fully impress itself on the country. Britain had then lost nearly a third of the merchant fleet that flew the Red Ensign on September 3, 1939.

And the tasks of the merchant ships had been multiplied. They had to bring food, raw materials and munitions over greater distances, and Britain's munition workers had trebled their consumption of raw materials. Ships had to support and supply larger armies in the Far East and the Middle East, with the Mediterranean highway practically cut off. Ships were required to carry great quanties of weapons and materials through the Arctic to Russia. No wonder there was the cry for "Ships, Ships, and yet more Ships!" Fortunately, there had been some profit from the experience of 1914-18, and the shipyards had not been idle.

BRITAIN'S FOURFOLD PROBLEM

Britain's sea problem—her chief war problem—was fourfold. Firstly, though the Royal Navy had been greatly reduced in strength in the preceding twenty years or so, the merchant ships had to be protected, which meant the maintenance of naval supremacy, the organization of convoys, and the fitting of defensive armament and other equipment to meet new developments of enemy attack.

Secondly, the enemy's weapons had to be destroyed or blunted as far as possible, by the use of the most effective strategy and counter-weapons at sea, and by bombing bases, ports, shipyards and factories supplying the enemy's shipyards.

Thirdly, each ship had to be put to the fullest and most effective use by the careful organization of imports, supply routes, of particular ships in relation to routes and imports, and by efficiently overhauling all port arrangements.

TASKS OF THE SHIPYARDS

Finally, lost ships had to be replaced, and damaged ships must be brought back to port and returned to service with the least delay. It is with this part of the vast and intricate sea problem that this chapter is mainly concerned. The other factors provide the perspective. The task of the shipyards would have been great enough even if losses had been small, for Britain entered the second World War with too few sea-going ships—2,000 less than on the eve of the first World War. But the losses were by no means negligible, and the most determined efforts of the shipyards, in shipbuilding and ship repairing, were vital to victory.

The measures adopted by the naval authorities soon had their influence on the sinkings. For some time after September, 1939, the losses of neutral ships—most of them then sailing singly—exceeded British losses. This was

evidence, not only of Nazi lawlessness, but of the success of the convoy system.

In the spring of 1940 the shipping situation took a violent turn for the worse. By occupying Norway, Denmark, Holland, Belgium, and all the Channel and Atlantic coastal areas of France, Germany gained ideal bases for U-boats, motor torpedo-boats, and long-range bombers. At the same time, when she could least afford it, Britain lost the considerable assistance of the French Navy, suffered serious naval casualties in evacuating British troops from the Continent, and had to meet the challenge of the Italian Fleet in the Mediterranean, requiring a diversion of strong forces from the Atlantic. She also lost the near sources of supply for dairy produce, iron ore, and other important commodities, which was the equivalent of losing ships, since more ships were required to carry these essential things—and over greater distances. The Atlantic route to America became the nearest and principal supply route. A further heavy strain on shipping came later, with Russia's entry into the war. Quantities of war materials had to be sent to the Persian Gulf, to Murmansk, and to Archangel past German air bases in Norway.

SHIPS FROM OUR ALLIES

Against these formidable setbacks there was one solid gain. By his military conquests on the Continent, Hitler sent into friendly British ports more than 7,000,000 tons of merchant ships, including 3,800,000 tons of the markedly efficient Norwegian fleet, and 2,620,000 from the Netherlands.

Later, the total of Allied ships was increased to more than 8,000,000 tons when Greece was occupied. With the ships came their officers and crews, eager to carry on the struggle for the liberation of their countries. It is true that some of these ships were already chartered to the British Government, but they were only a portion of the whole, and henceforward their continued service was guaranteed.

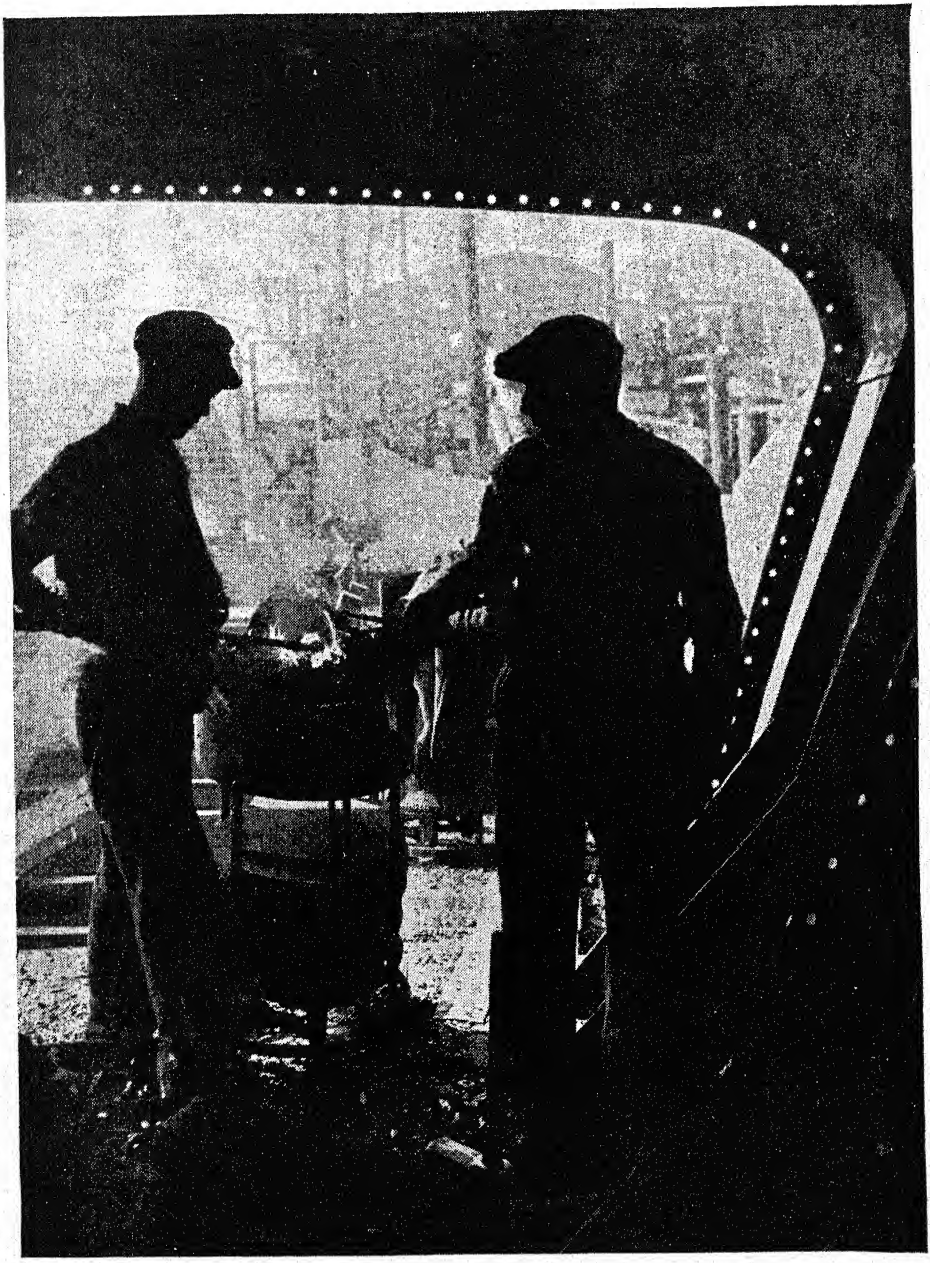
This great addition to Allied shipping strength may have saved an otherwise disastrous situation, but it did not alter the new strategic advantages for attack which the Germans had gained; rather it increased the number of their targets.

DEFENCE MEASURES IMPROVE

The graph of shipping losses slanted sharply upwards. In March, 1940, less than 100,000 tons gross of British, Allied and neutral ships had been sunk. In June the figure had risen to more than 500,000 tons. During the next nine months the losses averaged nearly 400,000 tons a month compared with a previous average of 182,000 tons.

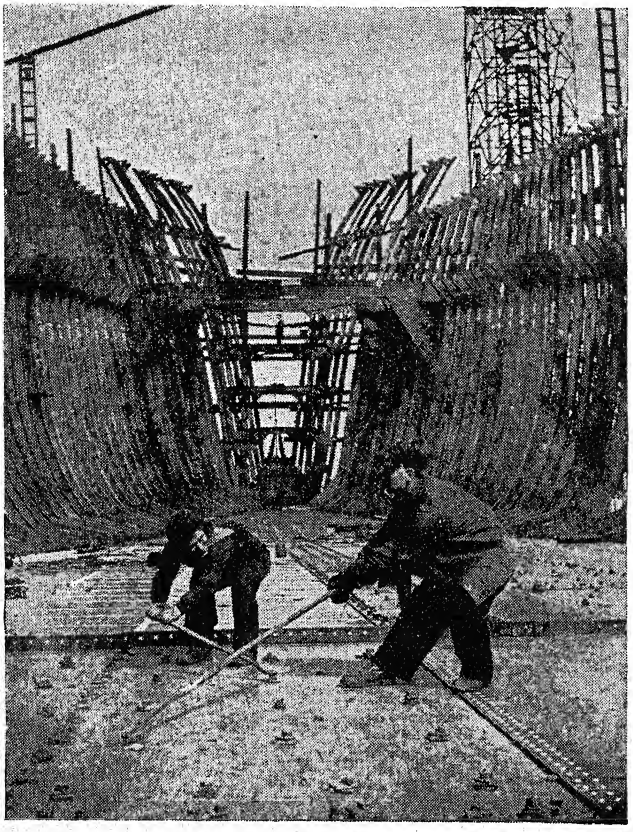
In the following spring of 1941 the Germans intensified their campaign. For three months the shipping losses averaged 534,000 tons. Germany was trying hard to defeat Britain by strangling her jugular vein. But the blitzkreig failed, although battleships and cruisers and armed raiders were sent out on the trade routes. Merchant shipping losses fell to about 180,000 tons a month; they were lower, in fact, than at any time since the overrunning of Europe. The improvement was not due to any slackening of effort by Germany. It was brought about by stronger naval and air escorts, by great prowess and courage on the part of British merchant seamen and naval personnel, and by the help of the American Navy, which patrolled the Atlantic as far west as Iceland, and escorted convoys.

Then a major upheaval in the course of the war, the most far-reaching of all, turned the tide once more against Britain and the Allies. When Japan launched her treacherous and powerful blow at the American Fleet in Pearl Harbour, a new phase of the sea war began. It was a desperate phase, yet one full of hope and encouragement, for the



RIVET HEATERS AT WORK

Intent on their job of preparing rivets for the plates of a new ship, these workers make a vivid shipyard picture. When the platers have finished their task of putting the plates of the ship into position, the riveters follow on. For speedy construction, plates are now welded together by heat in some shipyards, and many ships have been built in an astonishingly short time



BUILDING A MERCHANT SHIP

Platers are tightening the bolts of the bottom plates of a new ship. Ships were built in record time, both in British and American shipyards. The output per man of the British shipyard worker was the highest in the world, but for a considerable time the yards were handicapped by a shortage of labour

great American nation, with her untold resources, her power in men, was now a partner in arms with Britain, Russia, and the free peoples of Europe.

Because of President Roosevelt's leadership the Americans had shown greater awareness of the tremendous significance of ships in the war picture. But they were not prepared for a blow such as Pearl Harbour. For the time being it tilted the balance of sea power in Japan's favour, made possible Japan's rapid military victories in the East, and seriously affected the sea war in the West.

Shipping losses in the early part of 1942 were again heavy, too heavy for the rapid assembly and concentration of striking power which the military situation demanded.

To build up their strength at sea was the first task of Britain and America, and everything else hung on that task being successful. In spite of all the democracies' might, mobilized and potential, the dictators could, even at this stage, still have won the war by winning at sea—not in a pitched naval battle but by the slow pressure of attrition, by the sinking of merchant ships on a scale which exceeded replacement capacity over a long period, or prevented effective use of existing tonnage. Britain's sea power, composed of warships and merchant ships, is Britain's strength, but it is also her weakness in time of war. For merchant ships, the base of her economic and fighting strength, are especially vulnerable to torpedo and bomb.

Against this background can be seen the vast importance of the work in the shipyards. On the ability of the shipyards to replace losses, naval and mercantile, and to do more—to increase the strength of both these arms—depended the issue of the war and its duration.

One of the lessons of the first World War was that to neglect the building of merchant ships was to court disaster. This is clear from production figures. In 1913 British shipyards launched about

2,000,000 tons gross of merchant ships; in 1915 the total fell to 660,000 tons, and in the following year to 630,000 tons. The Government had concentrated on the building of naval vessels and had ignored merchant shipbuilding as a national problem. In addition, the claims of the Army on men and materials had been allowed to impair the efficiency of shipbuilding.

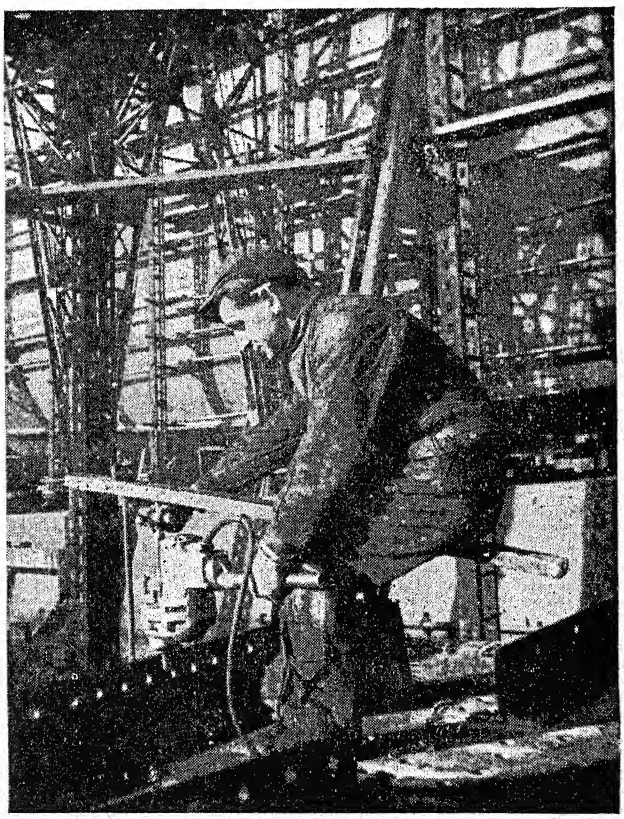
With a sudden rise in shipping losses in the spring of 1917 the menace of a broken supply line of merchant ships was at last recognized and panic expedients were at once adopted to meet a desperate situation.

What happened on the outbreak of the second World War? The Government had been blind to the menace of Britain's weakness at sea. For a long time it had been officially declared that Britain's merchant fleet was adequate for peace and war, and that even if it were not, the country could rely on neutrals. And so the warnings from all sides were ignored, and the shipbuilding industry languished for want of new orders.

There was more widespread unemployment than in any other industry. Thousands of men left the yards for better-paid and more regular work. Official complacency continued until the gathering war clouds were almost overhead. Then, in the spring of 1939, the British Shipping (Assistance) Bill was presented to Parliament. Its immediate purpose was to fill some of the empty shipbuilding berths, and that part of the Bill was put into operation in advance of Parliamentary sanction. The misery in the shipbuilding districts made quick action necessary.

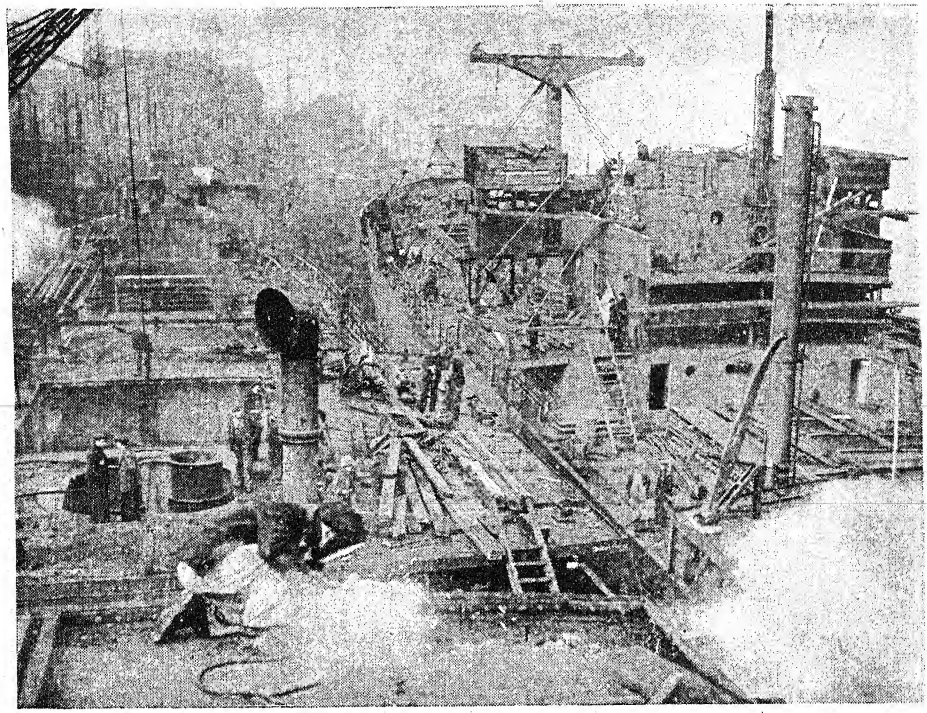
But before the Bill had reached the Statute Book the clouds of war had burst, and this belated legislation was dropped.

Following years of semi-starvation the shipbuilding industry was suddenly faced with a prodigious task, and attacked the emergency with ability and courage. The



HAMMERING THE RIVETS

To hammer the rivets connecting a ship's plates, once driven in by hand by squads of workers, pneumatic hammers are now employed, as the picture shows. When the riveter has finished his work, all plate junctions are firmly secured by caulking. With welded plates, one third of the labour can be saved



NEW SHIPS TAKE SHAPE

To build up her strength at sea was the first and most important of all the prodigious tasks before Britain. Upon the ability of the shipyards to build new vessels as speedily as possible, and to replace losses, the duration of the war largely depended. This shipyard scene shows ships under construction. In the foreground, protected from flying sparks, a welder at work

response to the national call reflects great credit on everyone associated with the shipbuilding industry.

The theme of those first months of war was "Get on with the Job!" The discussion and regulation of details were postponed if they threatened to hold up work for a day. And the shipyards did get on with the job.

One lesson of 1914-18 was heeded. Control of the shipbuilding effort was vested in practical men of proved organizing ability and drive, men who knew their job from A to Z. It is not customary for bouquets to pass between controllers and controlled, but in shipbuilding, efficient direction was generally acknowledged. The gain on this score was very considerable. At first merchant ship construction came within the province of the Ministry of Shipping, but, in the interests of co-ordination, was later transferred to the Admiralty, the department responsible for warship building. The types and design of the merchant ships were, however, decided in co-operation with the Ministry of Shipping, later Ministry of War Transport.

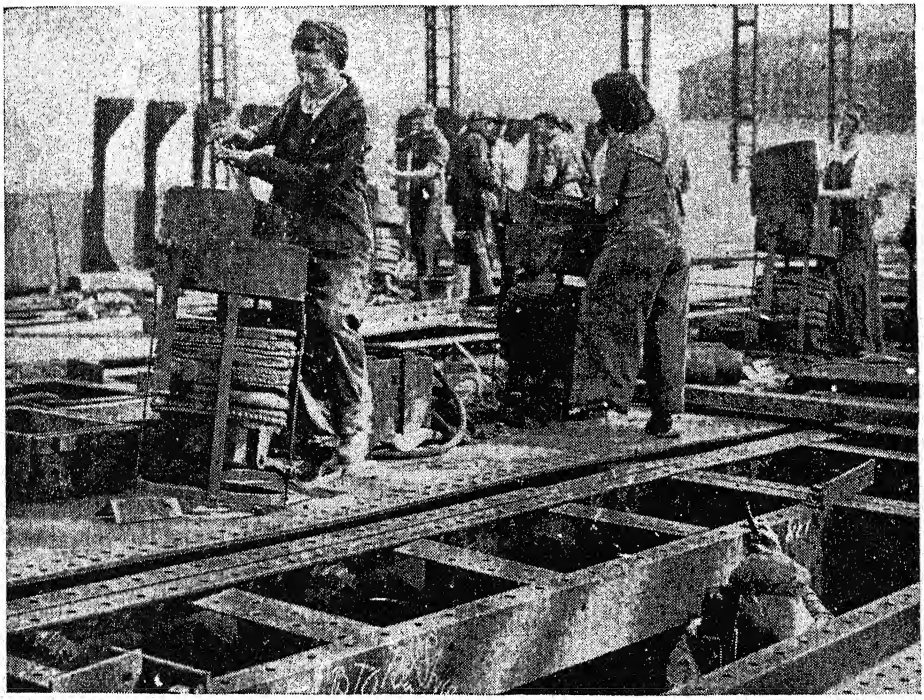
The shipyards first concentrated on those types of ships with which they were most familiar. That was the general policy, subject to adjustment according to strategical needs and to steady progress in the direction of standardization. It was helped by the fact that in the previous decade there had developed a decided

tendency among many individual shipbuilders to produce semi-standardized ships.

Several yards, for example, specialized in their own design of "economy" cargo vessels; others had been accustomed to build tankers of very similar types ordered by one or two of the big oil companies; while some builders had achieved a reputation for the construction of special types of meat-carrying cargo liners. On these general types the wartime programme was based. This was another important improvement on the programme of 1917. Then standardization had been carried too far and too quickly; it made insufficient allowance for changes between one shipyard and another and between districts. The policy of gradual standardization avoided disorganization, and kept all the many departments of a shipyard familiar with what they were doing. There is little doubt that the policy paid in terms of tons built.

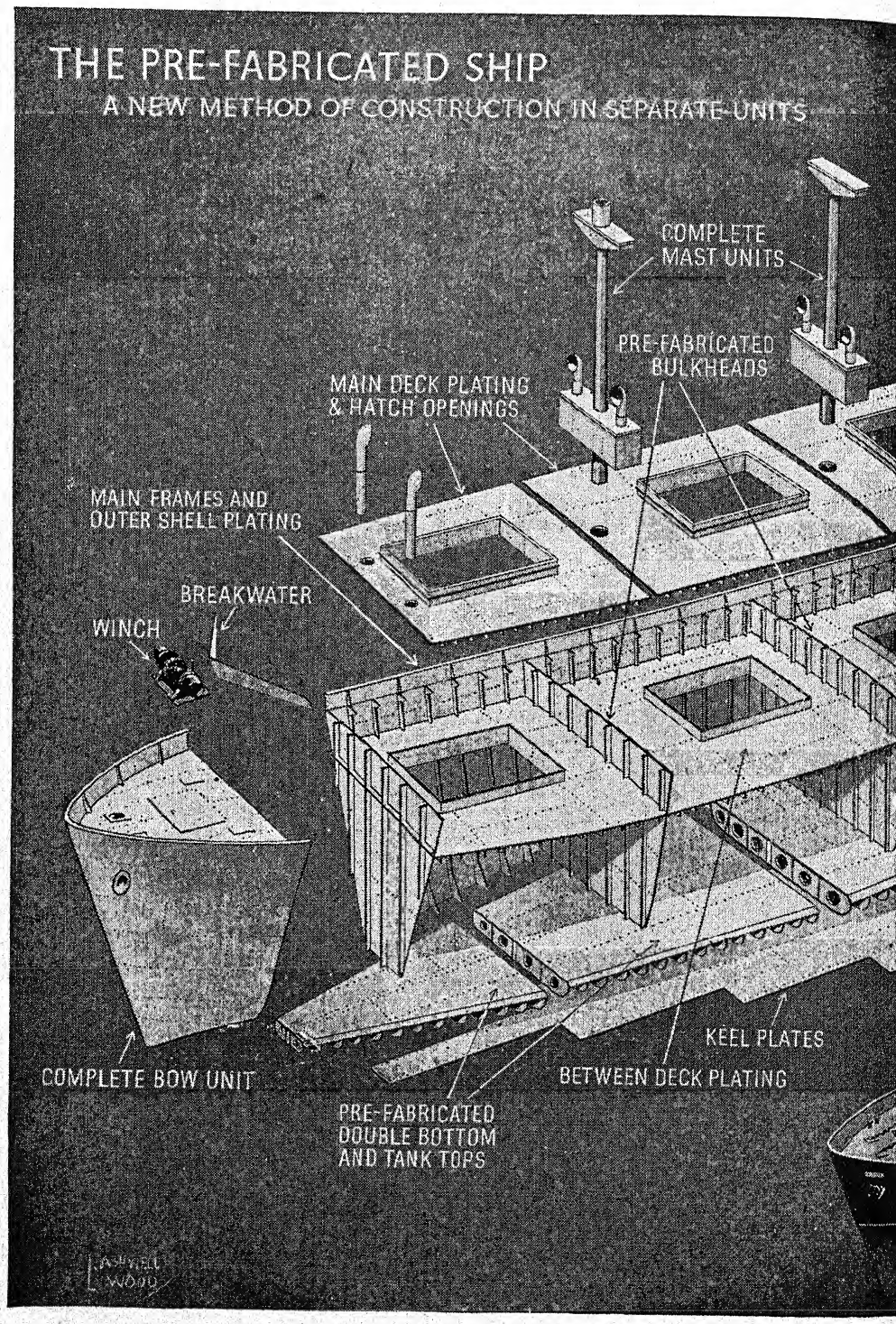
Eventually, seven main types of wartime merchant ships evolved. Chief of these was a tramp ship, or cargo vessel, with a carrying capacity of about 10,000 to 10,500 tons deadweight, usually propelled by steam reciprocating, or triple expansion engines, and simple Scotch boilers. Variations of this type were confined to details or the substitution of Diesel engines for steam.

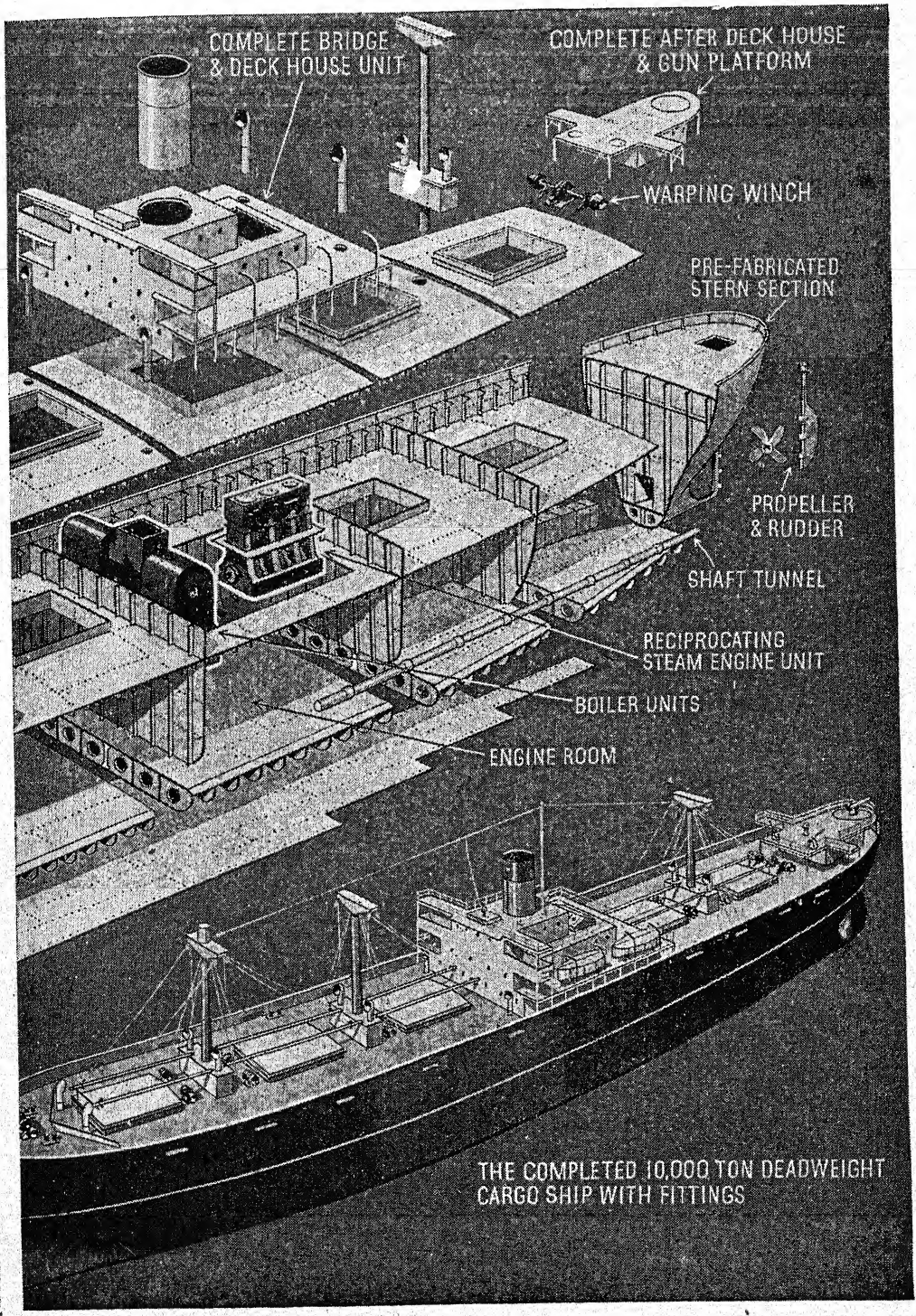
The standard tramp lacked many of the frills of a peace time vessel, and modern refinements in the engine-room were lacking. But she was an efficient vessel by



WOMEN WORKERS IN THE SHIPYARDS

Women played a valuable part in the wartime programme which demanded as many ships as possible in the shortest time, and in a year the number of women employed in the industry trebled. Here they are heating rivets, which are made of tested steel, ready for the riveters


THE PRE-FABRICATED SHIP
A NEW METHOD OF CONSTRUCTION IN SEPARATE UNITS
COMPLETE MAST UNITS
PRE-FABRICATED BULKHEADS
MAIN DECK PLATING & HATCH OPENINGS
MAIN FRAMES AND OUTER SHELL PLATING
BREAKWATER
WINCH
COMPLETE BOW UNIT
PRE-FABRICATED DOUBLE BOTTOM AND TANK TOPS
BETWEEN DECK PLATING
KEEL PLATES


COMPLETE BRIDGE & DECK HOUSE UNIT
COMPLETE AFTER DECK HOUSE & GUN PLATFORM
WARPING WINCH
PRE-FABRICATED STERN SECTION
PROPELLER & RUDDER
SHAFT TUNNEL
RECIPROCATING STEAM ENGINE UNIT
BOILER UNITS
ENGINE ROOM
THE COMPLETED 10,000 TON DEADWEIGHT CARGO SHIP WITH FITTINGS

comparison with the tramp of 1917, with a higher speed, and excellent crew's accommodation, and was well equipped for war service. In normal times such a ship—her defensive equipment replaced by the features of efficiency considered unessential in wartime—might take anything from nine to twelve months to build from the laying of the keel.

SHIPS BUILT IN SECTIONS

At the huge mass-production shipyard established at Hog Island, in America, during 1914-18 the record construction time for a far simpler vessel was ten months. British shipyards, short of labour, cut this time to six months, four months on the stocks and two fitting out. The speed-up was achieved by hard and efficient work and by the adoption of special wartime construction methods. Six months was a good average building rate. But these times are now considerably bettered. A notable instance was a tramp ship laid down in a Scottish yard on December 17, 1941. That was the worst time of the year because daylight hours were short, and very little work could be done after dark because of the blackout. Weather always interferes with shipbuilding, but that winter was particularly severe. Blizzards stopped all work on this vessel for twelve days. Yet she was launched at the beginning of April and sailed south on May 13, less than five months from the laying of her keel. That was not a record, but it was a very fine achievement in view of the difficulties of winter work.

This vessel, like others, was built on the system of pre-fabrication—one of the chief special construction methods that aimed at rapid production. Normally, a ship is assembled, bit by bit, as it lies on the stocks. With pre-fabrication, sections of different sizes are constructed on the ground, or sometimes even outside the shipyard at constructional engineering or similar works, and then lifted by cranes into place and joined up to the main structure. (*See* pp. 140-141.)

In the emergency, shipyards sprang up in the United States of America where pre-fabrication was used on a very large scale, because the older yards could be speedily extended and new yards laid out with that end in view. Ships were pieced together in huge sections weighing up to thirty or forty tons. Practically all joints and plates were welded together instead of riveted. With welding the two pieces of metal are fused by the application of intense heat, generated by an electric spark, and the deposit of additional molten metal from a rod or electrode. This also helped speedy construction because it was quicker to train welders than riveters, and the majority of American shipyard workers were new to their jobs.

These methods were not alone responsible for the sensational speeds at which ships were built in the United States.

SHIP BUILT IN TEN DAYS

Tramps were delivered by American yards in less than fifty days from keel-laying. In September, 1942, ten days after its keel was laid, a 10,500-ton Liberty cargo ship was launched at Mr. Henry Kaiser's Pacific Coast shipyard. Such records were possible because work was carried on for twenty-four hours a day, seven days a week. That meant employing at least three separate shifts of workers, nearly three times the labour force required for single shift working. This is mentioned because it touches the roots of the limited output of British shipbuilding. There were not enough workers.

The shipyard labour force was increased by many expedients. Men who had left the industry in the years of depression were recalled. New labour was trained. Women were employed on a considerable

scale for a variety of jobs, from rivet heating, welding, and painting to general labouring, carpentry and machine-shop work, but always there was room for more labour.

In the pre-war years of depression many shipyards had been closed down by a voluntary movement in the industry. The purpose was to cut out the facilities which, created to meet the war demands of 1917, were surplus to any possible needs of peace. In this way work was concentrated in the more efficient yards, huge overheads were saved amounting to enormous sums in a year, and the industry as a whole was put on a sound basis.

The move aroused considerable political controversy, mainly because it tended to aggravate the effects of the depression in some districts. It was often overlooked, however, that it also relieved conditions to a corresponding extent in other districts. Rationalizing the shipyards did not reduce the amount of work available, nor did it reduce the numbers employed in shipbuilding. The reduction was due to the world economic situation and to Britain's policy of disarmament.

SHORTAGE OF LABOUR

Many of the closed yards were reopened when war requirements once more superseded those of peace. Twenty-three were again in commission by the middle of 1942. The experience of one of these well illustrates the situation that dominated British shipbuilding from September, 1939. In the spring of 1941 this yard was put into working order, and a keel laid down. Over a year passed, however, before the first ship was launched and all the building berths were occupied. And the explanation was simply that the yard could not be properly manned, although there was no hesitation in taking on as many women as possible. At any time it could have absorbed at least twice the number employed.

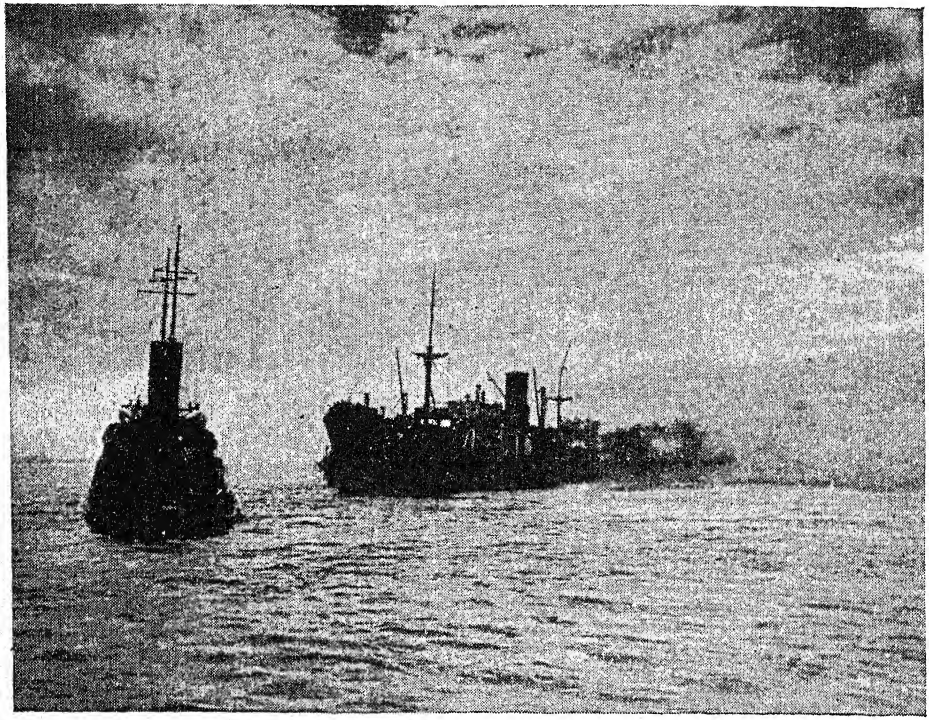
The output of merchant ships was not spectacular by comparison with the peak years of peace time construction. But that was because so much was demanded by warship construction and by repairs of naval and mercantile vessels. The naval programme—the long-neglected effort to strengthen the Royal Navy—made very considerable inroads on the production from berths that would otherwise have been filled with merchant ships.

GREAT EFFORTS OF THE WORKERS

Repairing and conversion of ships were also carried out on a tremendous scale, and such work could not be classified as shipbuilding. For this reason the shipyard effort could not be measured by the normal standard of mercantile tonnage *launched*. But, relating that tonnage to the proportion of men and facilities devoted to building merchant ships, the effort was astonishing. The output per man of the British shipyard worker was the highest in the world. No effort was more important in the whole field of war production than that of the shipyards, and none more creditable.

A new merchant ship calls vividly to the imagination. It is a vast creation, with a character of its own, a brain in the bridge and a rhythmic heart in the engine-room—and the Seven Seas and a thousand ports within its reach.

Created by mind and muscle from sheets of steel, thick girders, bends and angles, planks of wood, brass and delicate instruments, a ship is as shapely and self-contained as the human body. A new ship symbolizes adventure—from the human dramas that may be lived on the bridge, in the saloon, or far down in the heat and noise under deck and under sea-level, to the cargoes that may lie in the holds. A large mass of grain may seem unexciting, but the dullest imagination can find adventure in the thought that it comes to our tables from a field 8,000 miles away.



SAVING CRIPPLED SHIPS

Salvage work is as important as the building of new vessels, for every damaged ship must be returned to service in the minimum of time. Tugs try to bring a shipping casualty to a quay-side, but often they have to beach her in the harbour mouth, where the Admiralty Salvage Officer takes her in charge. This tug is drawing alongside a crippled ship, which is still smoking

A new ship is impressive. In war its colour is a sombre, purposeful grey instead of the bright freshness of a peace ship, but the hull, decks, and deckhouses are clean. The grey is in keeping with the grim duties ahead, and also with that gun in the stern, the tough little gun above and other guns farther forward.

ROMANCE OF A NEW SHIP

Later there will be signs of rust and dirt, perhaps a buckled top plate, scars from bullet and shrapnel; but, just completed, the ship is a clean hull with clean derricks and masts, new ropes and efficient winches. You glance back; and there is the open piece of ground, bordered by untidy scaffolding, and at one end a muddy river from which this huge, intricate, purposeful animal has sprung. It is now partly filled by an untidy, gaunt skeleton of rusty-looking steel, bare, metallic, lifeless. The achievement is wonderful. And seeing it in this way brings meaning to the knowledge that a ship has been completed in fifty days and less.

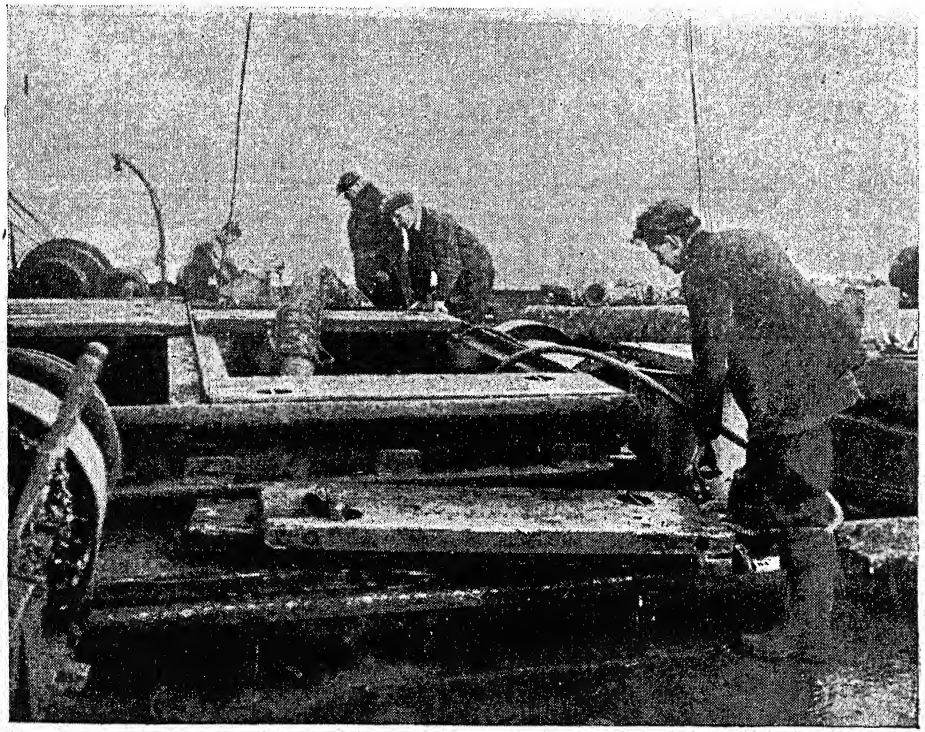
A new ship stirs the imagination of us all, although the British public may not be as sea-conscious as it should be in view of the history, economy, and geography of Britain.

Ship repairing is less romantic, but no less important. The repaired ship, old, perhaps, and ugly judged by modern standards, lacks the imaginative appeal she had when she slid down the ways

with a rumble of chains, a cloud of dust and smoke, and waves of water washing her on either beam; she is less impressive than when she pulled away from the fitting-out berth for her trials. She gets no mention in the papers. But if it were not for the work of the men who repair ships—the labourers' skill, the technicians' knowledge, the managers' experience and organizing ability—the British Merchant Navy would have been immobilized before the second World War was twelve months old. In the first three years 23,000 warship repairs and refits were carried out: 35,000 merchant ships and 140,000,000 tons gross were put back into service. In a single week 1,000,000 tons were sent to sea. Such achievements bear out the proud claim of the ship repairer, who is often also a shipbuilder, that his repairing job is a far more ticklish one than that of building. A firm may build a very good tramp ship of 10,000 tons deadweight, or smaller, but a high-class refrigerated liner would be most probably outside its range and an oil company might have to go elsewhere to discuss the building of a new tanker.

SPECIALIST TASKS

A ship repairer, on the other hand, must be able to apply the knowledge and skill of shipbuilders who specialize in several different classes of tonnage, from the barge to the passenger liner. He must be a skilled engineer and boilermaker, capable of handling many different types and makes of marine engines, and able to



SALVAGE WORK ON TIMBER SHIP

This damaged ship is floating on her cargo of timber, and salvage men are working on her. They have flooded the crew space forward to improve her trim. Amidships they are keeping pumps working at top pressure to get rid of water which poured into her when she was holed

solve technical and structural problems of his own. To borrow an analogy, the ship repairer is the marine surgeon and physician who must be ready always to tackle every marine ill and accident with all the surgeon's skill.

The British ship-repairing industry is the largest in the world. It is scattered around the coasts, an important strategical advantage. There are large ship-repairing centres, such as those on the north-east coast, and on the Mersey, but considerable facilities are found in Northern Ireland, South Wales, Falmouth, Southampton, and in Scotland on the Clyde and at Leith, with smaller yards at many other ports. The efficient maintenance of these dispersed yards should be a key part of Britain's maritime policy.

Ships are repaired in dry dock if the damage is below the waterline, or if the under-water part of the hull needs to be scraped, painted, or inspected. The function of the dry dock is to place the ship back on the building berth, and, like the building berth, it is served by cranes and derricks. It is the operating table.

MARINE HOSPITALS

But when the work is completed there is no complicated launching procedure. The water, which has been pumped out of the dock, is let in again until the ship is afloat once more, the dock gates are opened, and the repaired vessel towed out to open water. Dry docks are usually owned by ship-repairing firms who, as has been stated, may also be shipbuilders. But sometimes they belong to the port authority, or railway company, constructed as an investment and an addition to the port facilities; this applies to some of the docks in London, on the Mersey, at Southampton, Belfast, and elsewhere. The public dock, or railway dock, is hired to the specialist ship repairer for the purpose of carrying out the work.

There are about 125 large dry docks capable of taking ocean-going ships spread over thirty different ports, and more than half are privately owned. In addition there are the Royal dockyards maintained by the Admiralty, and a large number of smaller dry docks, pontoons, or floating docks, and slipways. To every larger repair necessitating dry-docking, there may be four or five ships requiring attention to deck, superstructure, or machinery which have suffered varying damage.

HEAVY DEMANDS OF WAR

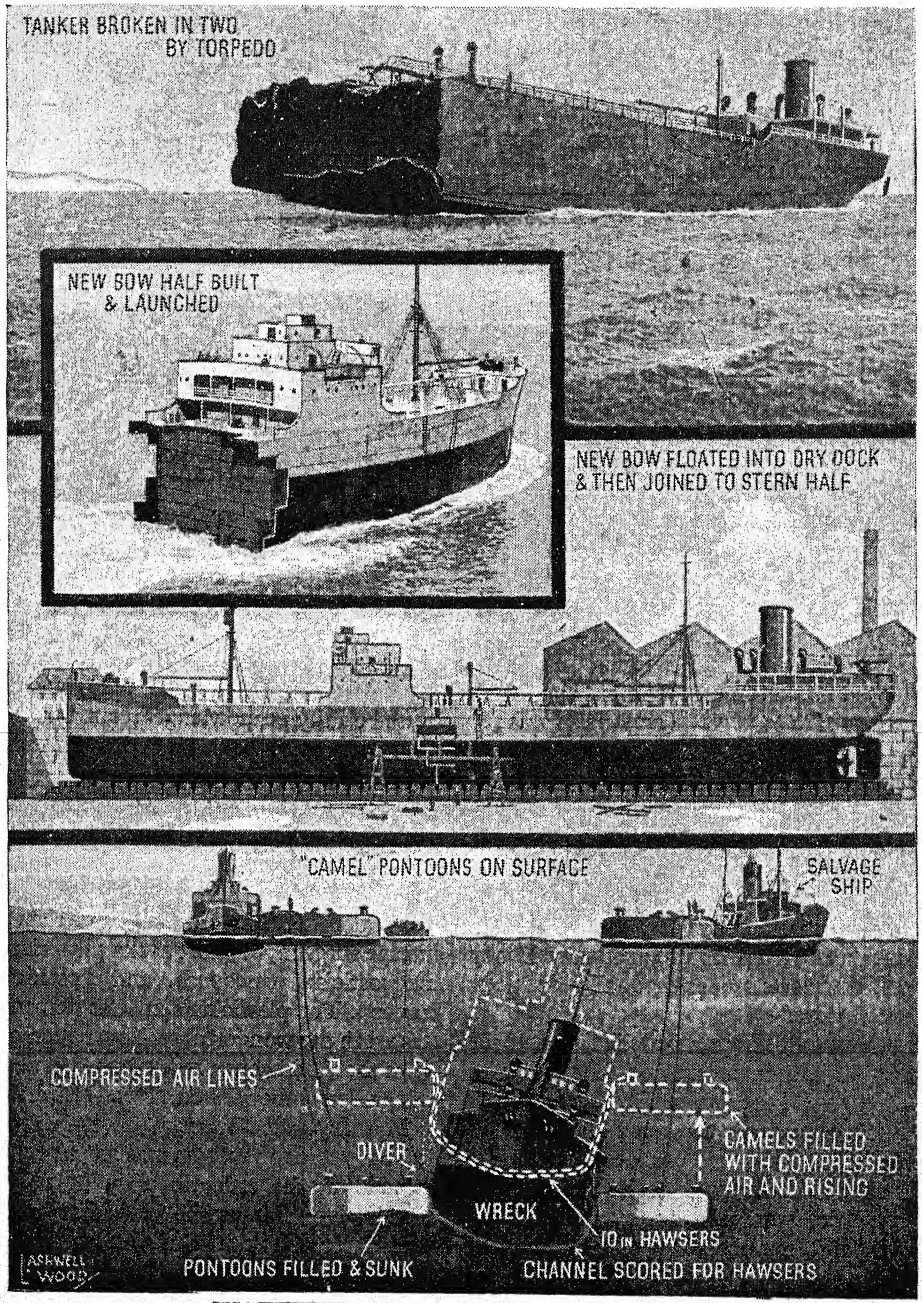
These are attended to alongside a wharf, or wet dock. They are the out-patients of the marine hospitals.

All these extensive facilities, apart from the Royal dockyards, were provided to meet the peace time requirements of the mercantile marine, and not by any means *all* the mercantile marine, for a large number of British ships, trading between distant countries, seldom entered home waters. Their overhaul and repairs were done abroad.

What are these requirements in peace-time? Occasional damage from the effects of heavy weather, collision or stranding, but more often the normal maintenance needed to ensure safety, seaworthiness and economical efficiency. Scraping of scale and marine growth from the ship's bottom, repainting, periodical overhauls required by law and carried out at the instance of the classification societies, the examination of corroded plates, and so on—all more or less routine work to keep the ship in a healthy condition.

How vastly different are the demands of war! What claims on ingenuity, initiative and even improvisation! Dramatically the whole scene changes overnight.

It is no longer a question of the frills of life, but life itself. Every ship must be returned to service in the absolute minimum time; every battered hull, however aged, that is capable of repair, must be



SHATTERED SHIPS MADE WHOLE AGAIN

Fig. 1. *Top pictures show how ships broken in two have been successfully salved and made fit for sea again. Lower picture, methods by which sunken ships are lifted from the sea-bed by means of "camels." Filled with compressed air, they rise to the surface with the wreck*

repaired, though in normal times it might be abandoned or merely sold for scrap.

Normal maintenance work may be slightly reduced to ease the demand. No more fancy paint, for instance. But it cannot be left undone. And on top of that come bomb, torpedo, shell and mine damage; attendance to gaping wounds in the side, broken pipes, cables and machinery parts; reconstruction of deck-houses and cargo spaces gutted by fire.

TRICKS PLAYED BY MINES

The freakish behaviour of bomb and blast was observed by everyone who experienced air raids. At sea miraculous escapes and unexpected destruction, particularly the latter, followed the explosions not only of bombs but of mines and torpedoes.

Shell damage was more "according to the book," but the powerful German magnetic and acoustic mines sometimes played extraordinary tricks on ships that managed to survive. The whole of a ship's engine might be shattered into a thousand pieces without the hull being pierced. In cases of lesser damage it was up to the ship repairer to piece the bits together like a jig-saw puzzle, whether it was a smashed bilge pump or a main Diesel engine, possibly an engine of foreign design and manufacture, just one of many different sorts of jobs that had never been met before.

It was, perhaps, the chief feature of ship-repairing in the war that began in 1939 that there was no precedent to the demands, neither the general demand on facilities nor the particular technical demand of the work to be done. They could not have been met by an inefficient industry, nor one without a tradition of initiative.

They could not have been met if the workmen themselves had not been inspired by that same tradition, backed by their individual skill and willing labour.

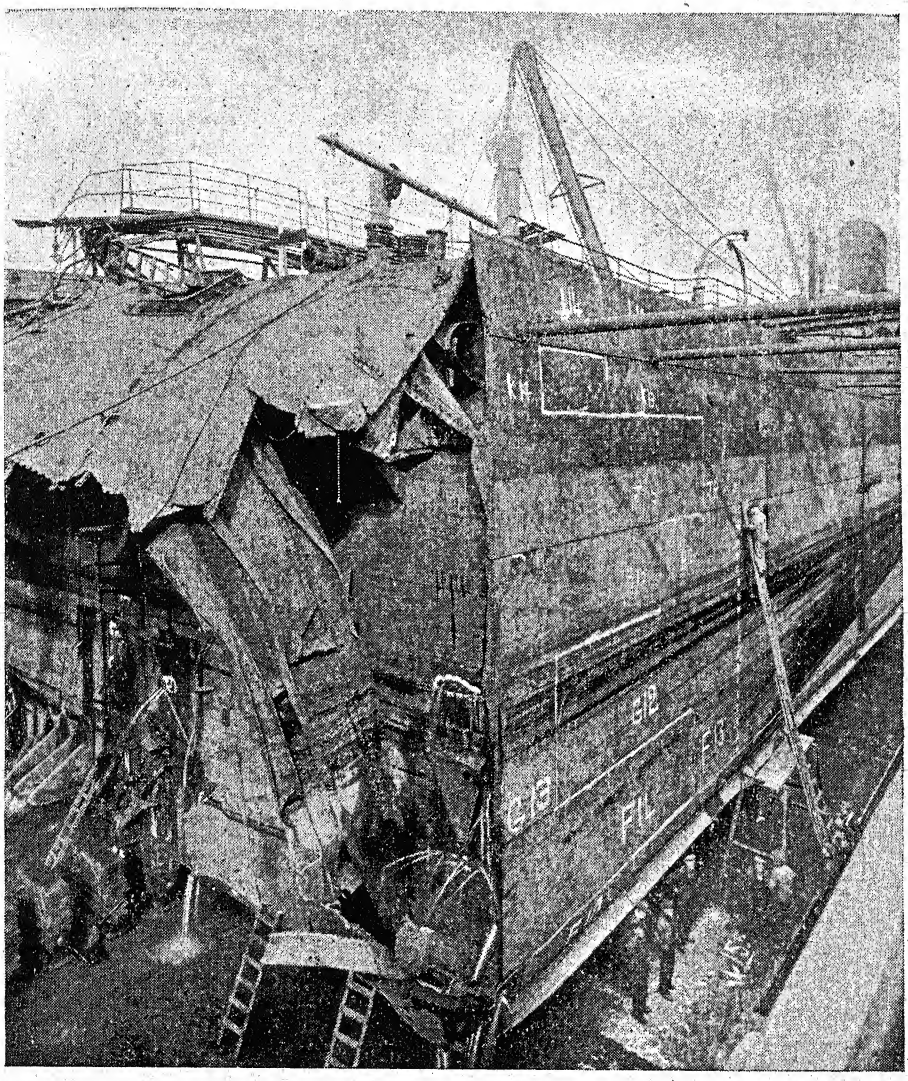
Bombs damaged more ships than they sank, and it needs little imagination to picture the volume of coastal and overseas ships that came under this heading. For aerial attacks were almost continuous around the British coasts, far out into the Atlantic, and on the northern route to Russia past Norwegian bases. Bombs, incidentally, were not unknown in the building and repair yards themselves! Added to the damage from war weapons were higher marine casualties—so they were termed—due to sailing in convoy, navigation without lights, voyages on routes that would be unheard of in peace time, and other consequences of war.

Collisions, strandings and weather damage were all increased. Besides these extra demands, repairs to the huge fleet of Allied shipping had to be done mainly in British yards, where formerly all the facilities of Europe were open. After a time the United States and the Dominions gave increasingly valuable help, which must be fully acknowledged. But this by no means cancelled the extra tonnage dependent on Britain's ship-repairing industry, apart altogether from the unusual attention these ships required.

MENDING BROKEN SHIPS

The ship repairer had to be more than a marine surgeon; he must act as physician, diagnostician, osteopath, and "plastic" surgeon. The plastician's art was demonstrated in the wonderful reconstruction of ships that had broken in half, one portion lost and the other salved (Figs. 1 and 2).

The *Imperial Transport*, a tanker of 12,460 tons dead weight, was struck by a torpedo in the Atlantic early in 1940. Within five minutes she broke her back. The crew took to the boats, but when they found the after part still afloat they boarded it, and set to work to save their caricature of a ship, square to the sea, with twisted, broken shell plates and slanting deck. They corrected the trim by



THE SHIP THAT BROKE HER BACK

Fig. 2. *Struck by a torpedo, the motor tanker "Imperial Transport" broke in half in five minutes. The crew found the after part still afloat and boarded her. For two days their half-ship drifted in high seas, and was then towed home. The smashed stern half, salved, is in dry dock, showing great damage to deck and bulkhead. Side plates are marked off for cutting*

transferring water from one tank to another, and started the engines. The half-ship's behaviour under power was far from satisfactory, and in view of the high seas it was decided to let her drift. Two days went by. Wind and sea having dropped, engines were put ahead, and what was left of the *Imperial Transport* steamed for forty-eight hours at about 3½ to 4 knots. Eventually, an escort came to the rescue, and a tug, the *Buccaneer*, took the half-ship in tow.

A new fore part was built to the ship's original plans and was launched bow first, with deckhouse, mast, derricks and auxiliary equipment complete (Fig. 3). Meantime the damaged half had been docked, the battered bulkhead cut away and side plates cut back to avoid a straight vertical join. The deck plates were also staggered. The docking of the new half had to be done in such a way that the already docked portion did not float off the blocks on which it rested.

AS GOOD AS NEW

Then the two parts were aligned and the new bow, supported by a specially built cradle, was "launched" by block and tackle into the correct position for riveting, an operation that meant working to exact measurement. The joining of plates and frames was fairly straightforward, but pipes, cables, and the pump system had all to be connected up.

This was an impressive demonstration of ship repairing success. In such an adventure are concentrated the dangers and violence of the battlefield of the sea; the brave resourcefulness of the men who fight upon it; the salvor's part and his skill; the different skill of builder and repairer, working on slipway and in dry dock—and the defiance of maritime Britain.

Another tanker, of about the same size as the *Imperial Transport*, was mined and broke in two. I saw her lying at an angle in a muddy north-east coast river, with her plates still jutting and bent. She looked forlorn, lifeless, "beyond repair." But a little farther down on the opposite bank, from where the crescendo of riveting din blazed forth the opposite theme, another half was beginning to take shape, though it strained the imagination to associate one with the other, or either with a complete immaculate ship.

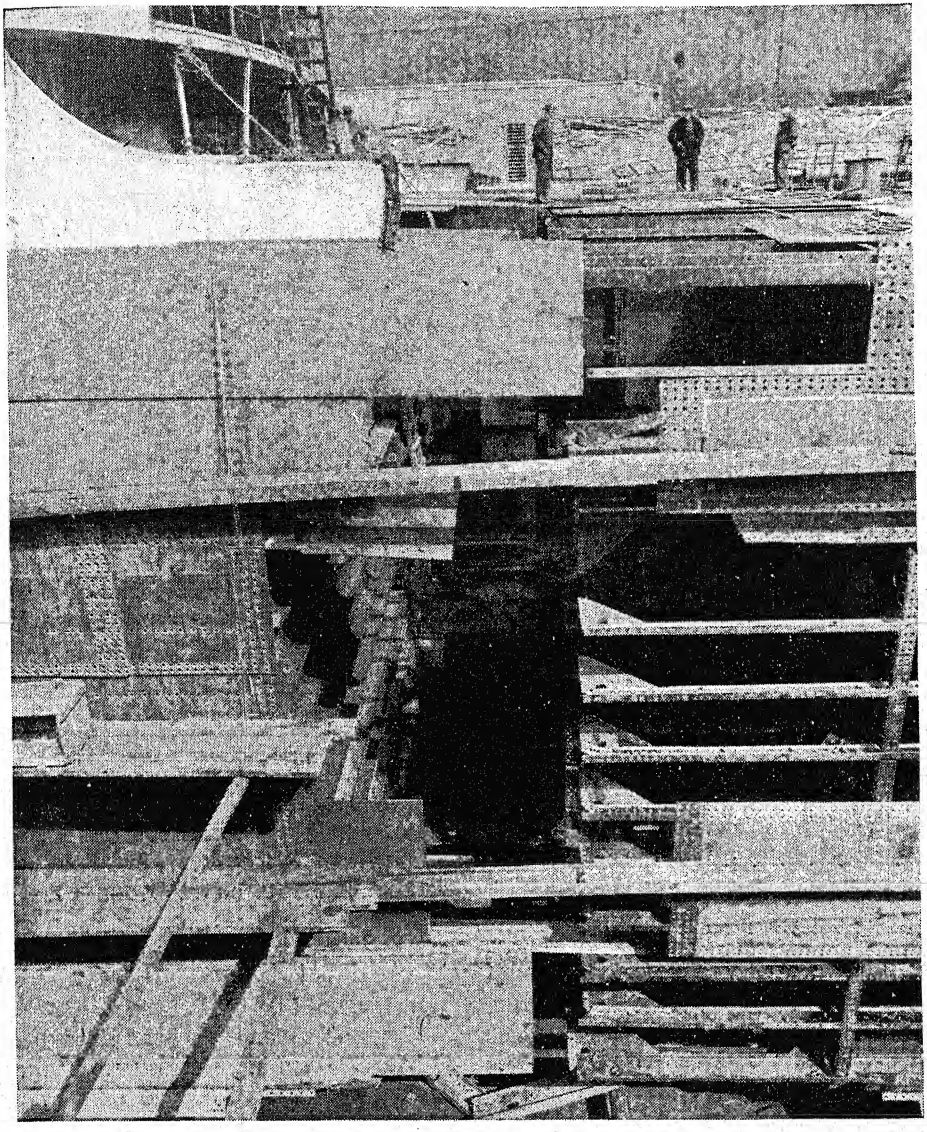
The new fore part was about 200 feet long, and it was built at the top of the berth. With a good clear run to give it momentum sufficient to clear the ways, this half was launched bulkhead, or square end, first (Fig. 4). Both halves were docked, and within a few weeks the tanker was at sea again, soon to return with 12,500 tons of a cargo on which every fighting service is absolutely dependent —oil fuel. As efficient and valuable as before, she now had a special claim to attention, for she was an international ship. Two countries helped to build her.

The original vessel was built in Sweden before the second World War. Compared with an entirely new vessel she represented a saving of considerable time and labour, about 1,500 tons of steel, a great deal of complicated equipment, and a 6-cylinder Diesel engine. At a casual glance the new vessel presented an entirely normal outboard appearance, as would be expected. But a close inspection would reveal her unmistakable birthmark, her war medal, perhaps. The sides, or shell plates, of the Swedish stern portion presented the smooth surface that is one of the attributes of welding. The plates of the British bow were lapped and riveted, though they covered some welded joints.

THE INFLEXIBLE RULE

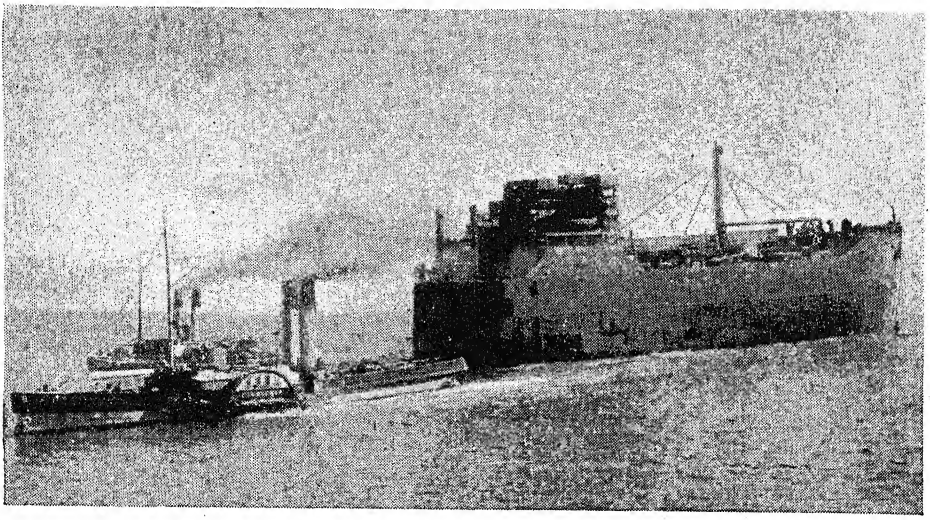
Examples of other major repairs, such as patching up holes the size of a house-side, were legion. They required just as much skill, sometimes more, just as much ingenuity. In all cases the work was governed by a rigid rule, one that was unknown in peace time: everything to make the ship seaworthy and sea-going must be done but no more, for the pressing need was the ship at sea.

Like shipbuilding, ship repairing in the second World War gained much by efficient direction and control. The allotment of work between different yards according to available facilities, the position of the ship and the amount of work already in hand could so easily have been



JOINING THE TWO HALVES TO MAKE A NEW SHIP

Fig. 3. *From the shattered half of the "Imperial Transport" a new ship was created. This job was a good example of the excellent and intricate repair work continually being carried out in the shipbuilding yards of Britain. After the damaged stern half was repaired, a new fore portion was built to the original plans of the ship. This was docked on a specially built cradle so that it could be manœuvred into exact position for riveting to the after part. The new half-ship was docked to within 9 feet 8 inches of the repaired half in such a way that the latter would not float off the blocks. Then hydraulic jacks started the new half-ship moving until both halves were correctly aligned. This operation completed, the rest was straightforward repair work. The two halves are shown in position in dry dock, ready for the final assembly*



LAUNCHING A NEW HALF-SHIP

Fig. 4. *Complete with deckhouse, mast, derricks and auxiliary equipment, a new half-ship is launched. In care of tugs, it is now on its way to dry dock, where it will be joined up to the repaired half. In some cases ships broken in half have been repaired and made seaworthy in a few weeks, providing impressive demonstrations of ship-repairing skill and success*

muddled. It was not. And that meant more ships at sea, for the speed of repairs was a major factor in the war with the U-boat.

The function of control was also to see that existing facilities were employed to the greatest advantage, that the methods were the best and most efficient, and that facilities and plant were expanded and modernized. It demanded energy, ability, and a thorough technical and general knowledge of the industry. Fortunately, these qualities were not lacking. A spirit of enthusiastic drive was infused into the ship-repairing effort. It did not slacken.

EFFICIENCY OF CONTROL

There is an instance that illustrates the way things were done. A thousand miles from a British repair port, a ship put in to a small harbour severely damaged. She could be brought home with comparative safety, but a fair amount of repair work would have to be done. A description of the damage was wired to repair headquarters. When that ship arrived at her destination not long after, plates, girders, and new equipment were waiting on the dock, cut, shaped, and ready for assembly. The time for that job was halved.

But repairs, so numerous and complicated though they were, by no means limited the demands on the industry.

The rival and fluctuating calls of building war and merchant ships, of repairs and of conversions have already been mentioned. Conversions were no less important than the other tasks of the shipyards—some were at the top of the priority list. The volume of work they represented was considerable, perhaps as much as the equivalent, in a single year of war, of the entire output of merchant ships in a slack peace year.

Under the heading of conversion may be put everything ranging from the installation of a gun—converting a defenceless merchant ship into a vessel that could sink a U-boat—to the metamorphosis of liners into auxiliary cruisers. The work

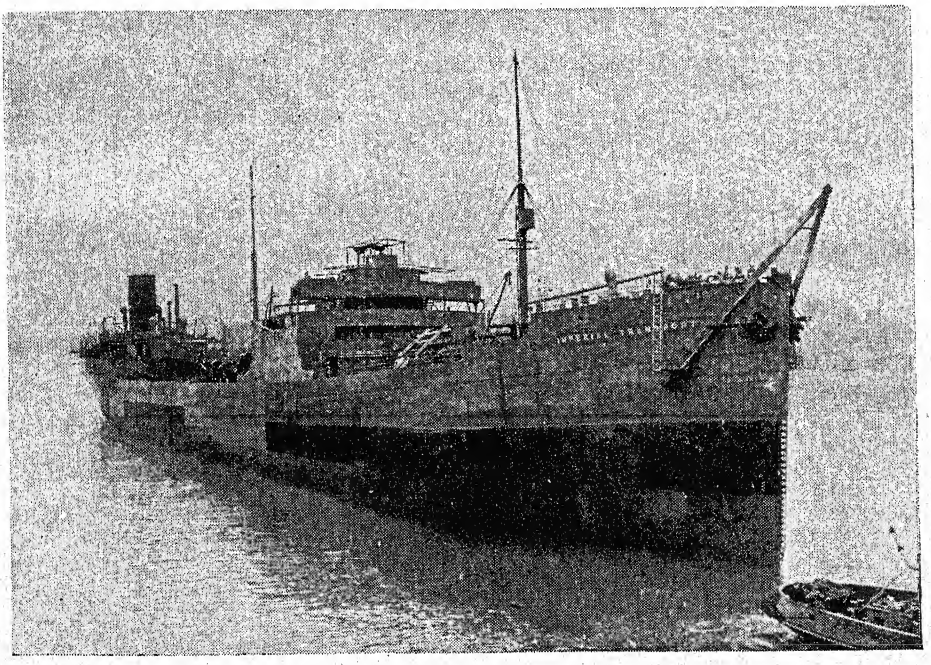
of conversion was divided between the building and repair yards, but the bulk of it fell on the repairers. At the outbreak of the second World War there were about 3,800 British steamers and motor ships of 500 tons and over, and 1,760 of these were engaged in overseas voyages. Nearly all these ships, coasters as well as ocean-going vessels, had to be fitted, at some time, with guns, degaussing apparatus for countering magnetic mines, emergency rafts, and a great quantity of other safety equipment, some of which had to be specially installed and not just taken on board.

Fitting a gun was not just a matter of a few bolts through the deck. A special platform had to be built and more often than not it was necessary for extra stiffening to be introduced to enable the hull to stand the strain of the gun's recoil.

Bridge-houses had to be protected from aerial machine gun fire. This was done in some cases by fitting concrete slabs, and armour-plating and an ingenious bullet-resisting plastic were also used. Other parts of the ship had also to be altered.

CONSTANT CHANGES

Adding considerably to the total amount of work, was the fact that it could not all be done at one time. Requirements changed with changes in the enemy's weapons and tactics, and as defensive answers were found. Early in the second World War, while many ships were having their defensive guns installed, scientists were still grappling with the reply to the magnetic mine; those ships had to return to the repair yard for the installation of a degaussing cable, which was the successful countermeasure to the new weapon.



BACK TO SEA AGAIN

The new "Imperial Transport" leaves her dock, to return to her job of conveying cargoes of oil fuel, upon which all the fighting services depend. The importance of speedily returning the "Imperial Transport" to service needs no emphasizing, for she can carry 12,500 tons of oil

Similarly, merchant ships were originally equipped with a single gun aft in the vain hope that the Germans would abide by International Law, which provided that a defensively armed ship must be warned before attack and the safety of the crew and ship's papers must be assured. When air attacks developed, however, additional anti-aircraft guns of different types were fitted in different parts of the ship. Again, this necessitated more visits to the repair or "conversion" yards.

MANNING THE GUNS

What this involved in the way of extra work is shown by these few facts about the arming of merchant ships. In the first six months of the second World War 1,900 ships were defensively armed, and by the end of the first year nearly 3,000 had been equipped. Yet in a later year, 1941, all but 13,000 anti-aircraft guns were fitted in merchant ships; some of this work was done abroad, but most of it in the ports of the United Kingdom. On top of that, 4,843 ships of different sizes and nationalities were fitted with anti-aircraft devices other than guns. There was practically an unending flow of this sort of work.

D.E.M.S. PERSONNEL

With all this gun-power on board, defensive though it was, merchant ships somewhat changed their character. The guns had to be manned and that meant trained gunlayers. Thus the maritime regiments of "Defensively Equipped Merchant Ships" gunlayers gradually evolved. The additional personnel had to be accommodated: easy enough in a new ship to rob a bit more cargo or deck space for larger crews' quarters; by no means easy in a vessel built twenty years ago, with quarters already cramped! Here was one more conversion demand of considerable size. It had to be met.

Most of the war-servicing of merchant ships, though it weighed heavily on sorely taxed facilities and labour, represented minor conversion work considered as individual jobs. But it all had to be dovetailed into the shipyard programme so that congestion was avoided as far as possible, so that sufficient ships were kept at sea, and so that the seamen were, with least delay, given every available means of hitting back at the enemy.

Major conversions were of a different nature. A passenger liner with spacious rooms and expensive furnishings will not make an efficient auxiliary cruiser without a great deal of work and a lot of new equipment. The accommodation must be practically stripped, public rooms redesigned, hull strengthened, guns—offensive guns—installed fore and aft, extra buoyance provided, armour-plating fitted, and a hundred other things that make up the difference between a floating hotel and a fighting ship. Many large liners were transformed in this way.

CONVERSION OF MERCHANT SHIPS

Little less extensive was the work of converting passenger ships to troop transports and hospital ships. They might be small cross-channel vessels, or huge liners, the *Queen Mary* and *Queen Elizabeth* among them. It was not unknown for a troopship to be converted into a cargo carrier and reconverted as a trooper between one voyage and the next so great was the pressure on shipping space.

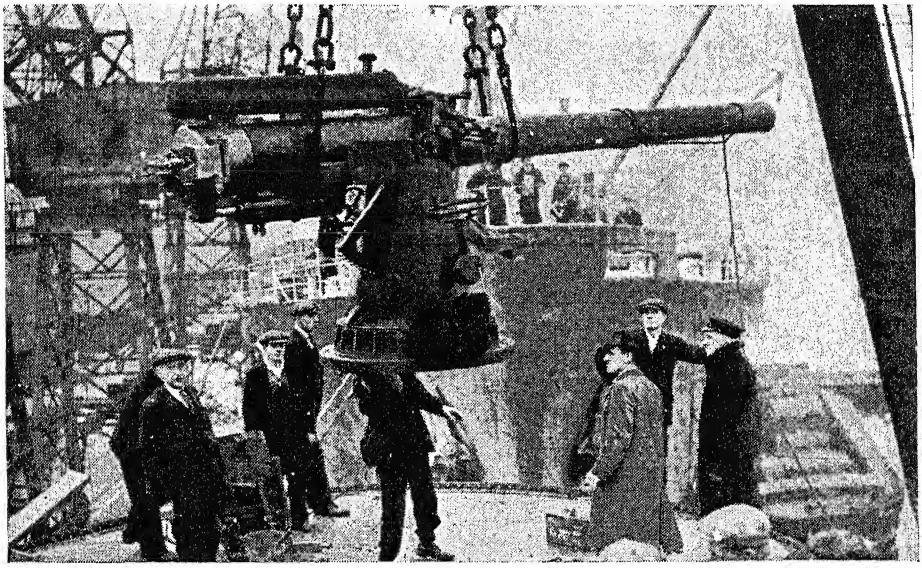
There were many other sorts of conversion jobs involving the largest and the smallest of vessels. Trawlers and excursion steamers into minesweepers and minelayers were among the many jobs. The functions of many hundreds of ships changed with war, and usually the ship had to be changed accordingly.

Routes changed also. Ships built for no more arduous a winter route than the South Atlantic carried tanks and aeroplanes to Russia's arctic ports, through ice and blizzard and temperatures of 52

degrees of frost. They could not do that without alteration to equipment and accommodation—additional heating, lining of cabins, improved ventilation, and strengthening the hull against ice pressure.

Conversions, as well as repairs were, in fact, out of all proportion to the work carried out in 1914-18. That must be remembered when output is compared with output. The war was begun in 1939 with barely a third of the shipyard workers employed in 1918. Though it was manpower that placed the limit on production, yet in the first two and a half years of war British shipyards built a greater tonnage of naval and merchant ships than in the first three years of the first World War, apart from the tremendous volume of repair and conversion work, far exceeding that turned out in all 1914-18.

The Deputy Prime Minister declared in the spring of 1942 that the actual current production of ships was then greater than at any time in the last war, when there were more yards, more men and no blitz and blackout. And at that time nearly half the shipbuilding labour of the country was employed on repair work! Though new labour was by then coming along very slowly, production continued to advance, and the shipyards received a measure of priority that had been lacking. No class of war production could better the record of the British shipyards, if it is fully examined.



ARMING BRITAIN'S MERCHANT SHIPS

D.E.M.S., the department of Defensively Equipped Merchant Ships, was responsible for fitting vessels with guns and equipment to withstand U-boats and other enemy attacks. For installing guns, the structure of the ship had to be strengthened, and this work was divided between building and repair yards. Picture shows a gun being lowered to deck of a merchant ship

If it is true that no two ship repair jobs are alike, that is equally true of salvage. No disabled ship presents exactly the same problem to the salvor as another. Yet every vessel capable of being saved must, in wartime, be brought into port, despite the constant dangers while limping home without convoy protection.

As in the case of repairs, the demand for salvage services from the outbreak of war far exceeded the needs of peace. The

authorities were able to fall back on the great experience gained in 1914-18, but, unfortunately, the fine equipment and salvage fleet built up in those years, no longer existed when the call came in 1939. Owing to lack of support and to the keen competition of continental firms, particularly Dutch and German, British salvage facilities had been allowed to decline seriously. Extensive Admiralty equipment had been dispersed.

The Admiralty Salvage Service in 1914-18 had been built up largely on the vessels and personnel of the Liverpool Salvage Association. This Association was formed in 1857 by shipowners, merchants, and underwriters of marine insurance to act in their common interests. Between the two wars, it was amalgamated with the Glasgow Salvage Association, another old established concern operating on similar lines.

Again in 1939 the Liverpool and Glasgow Salvage Association, with its specially designed plant and trained personnel, formed the nucleus of the country's salvage resources. In a single year (1941) the Association successfully salved a number of merchant ships representing 385,400 tons gross, much of it loaded with valuable cargoes, which were also saved. Besides the association, which is a non-profit making concern, there were three or four important private salvage and towage firms as well as a number of smaller companies normally engaged chiefly in towage.

A MILLION TONS SAVED

Between the spring of 1940 and March 1941 the number of salvage vessels available had doubled. In less than eighteen months more than 1,000,000 tons had been rescued, as well as much cargo and equipment from vessels that had had to be abandoned. The jobs, all vitally important, varied from such complicated tasks as the raising of the submarine *Thetis* in Liverpool Bay (she sank before the outbreak of war) to a simple towage in calm weather.

Not all towage operations, however, are simple. The rescue of the cargo steamer *Macbeth* was typical of the sort of work the salvage tugs might expect at any time. The ship broke down in mid-Atlantic during the notorious winter storms of 1941-42. A tug stationed at a Canadian base was sent to tow her back to Canada.

The gale was in the wrong direction and got steadily worse; after towing the steamer about 400 miles the tug was compelled to return to her base to refuel, leaving the *Macbeth* wallowing helplessly, a sitting target for any prowling U-boat.

A NOTABLE RESCUE

While the tug was refuelling for another rescue attempt, it was decided to send a tug from the British side of the Atlantic to tow the *Macbeth* to a United Kingdom port, and the *Zwarte Zee*, a famous Dutch salvage tug, with her Dutch crew, was detailed for the job. The *Zwarte Zee* was the largest and most powerful salvage vessel in the world, but she got a hammering from the weather on her way out. Her lifeboat and jollyboat were washed overboard, the raft was smashed, all the hatch covers were torn off. At times this powerfully engined vessel, capable of over seventeen knots, could not exceed five knots. Nevertheless, she found the *Macbeth*, rolling heavily in a beam sea. Soon afterwards the other tug arrived from the Canadian side. She was eventually sent back to her base.

The *Zwarte Zee* got her heavy 6-inch towing wire ready; no easy matter with heavy seas constantly crashing over the deck and throwing the gear all over the place. Oil was pumped overboard to calm the sea, and a heavy line was somehow got across to the *Macbeth*. As the *Macbeth* could not raise steam on her winches or anchor windlass, her entire crew were mustered to haul in, first a 3-inch rope and, finally, the heavy 6-inch towing wire.

After tremendous efforts the wire was got on board and made fast to the anchor cable, and the *Zwarte Zee* started her long tow through hail and snowstor ıs. At last the weather moderated. In six days the *Macbeth* was towed a distance of 900 miles and brought safely into port.

Many wonderful feats of salvage were performed by ships' crews without the aid of special salvage craft. Another vessel, with her back partly broken, beached and given up for lost, was brought to port under her own power, with improvised steering gear, a distance of 2,000 miles through many air attacks. In the Atlantic a ship was hove to in a tremendous storm when her engines stopped. This exposed her to the full brunt of the storm. Then came a crash which shook the vessel as if she had struck a mine; in the engine-room pieces of metal were sent flying and clouds of steam followed. The exhausted crew waited for the end, expecting the vessel to sink. Eventually, it was discovered that the crash had come, not from mine or torpedo, but from a tremendous wave which had smashed in the hull plates and seriously fractured a steam pipe.

SAVING A WHALER

Ten days later that vessel reached port with a full cargo of oil. Another tanker, the *Tachee*, partly steaming under her own power and partly in tow by a corvette, was brought 592 miles in 5½ days after having been torpedoed and set on fire. The master and chief engineer of the *Tachee* were awarded the O.B.E.

A valuable ship which was saved under great difficulties was the whaling factory ship *Svend Foyn*, a British vessel of 14,800 tons manned by Norwegians. She was homeward bound with 20,000 tons of oil in her tanks when she ran into bad weather. Two of her lifeboats were washed away, and two of her rafts were pounded to pieces on her decks. Then she was attacked by a U-boat and torpedoed.

The *Svend Foyn* opened fire on the U-boat and drove her off, but a hole had been blown in her side, and the sea came washing in. The ship had to be trimmed, and some of the fuel oil pumped from her tanks, but the valves lay 10 feet deep below swirling black oil and water.

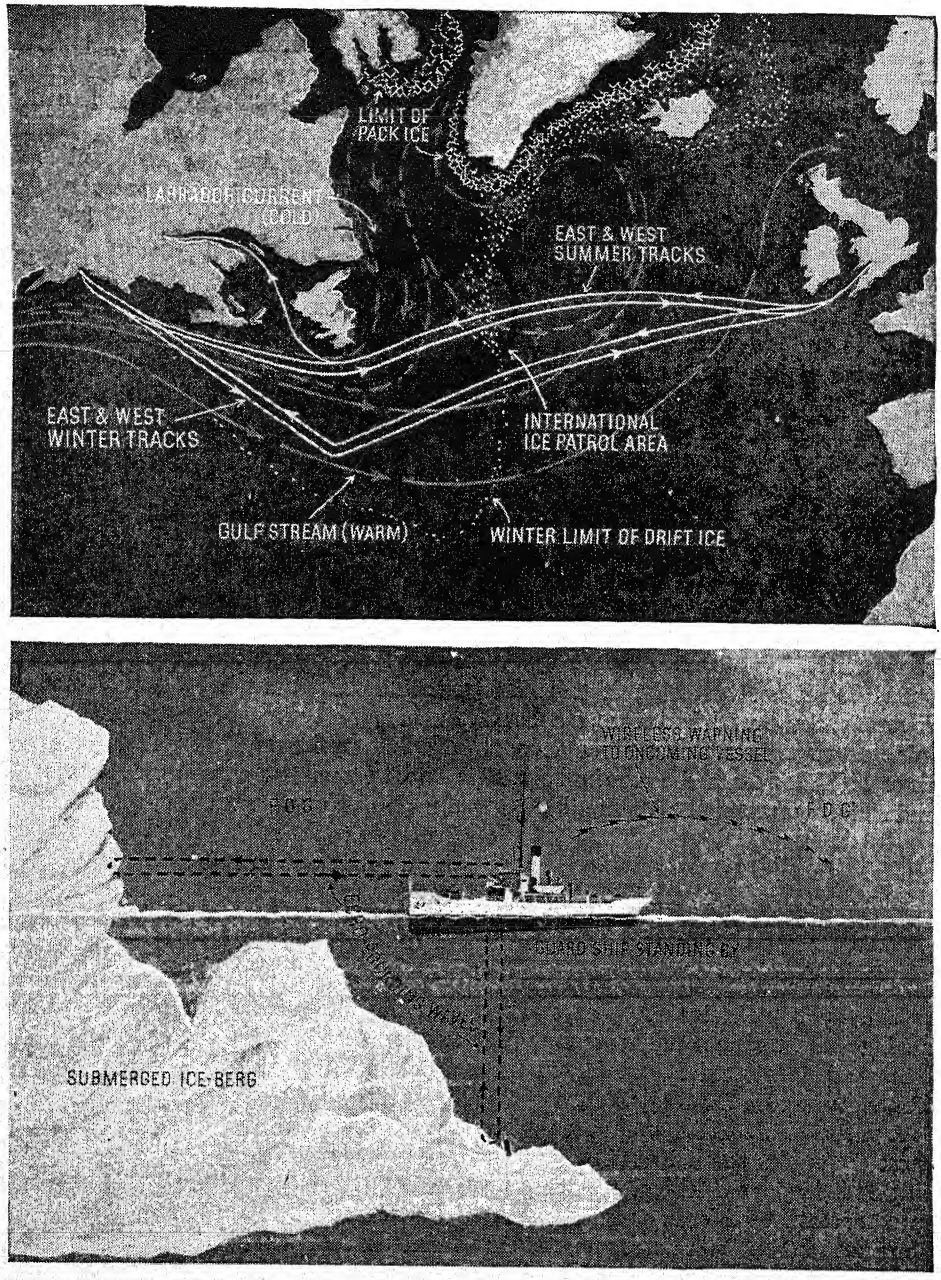
SIX BOILERS ADRIFT

In the meantime the storm had increased. Down in the 'tween decks some of the 60-ton boilers, in which whale blubber is rendered down, had broken adrift and were crashing about with the movement of the ship. Six of these huge boilers smashed their way through the gap in the ship's side and fell into the sea, enlarging the hole to 70 feet wide by 40 feet deep.

But the valves had to be freed. Under the direction of the chief engineer four young pump men in their 'teens put on diving equipment and went down into the swirling oil, seawater, and crashing machinery. It was useless to attempt to use an underwater torch—the most powerful torch made would not penetrate 6 inches through the black, viscous oil. Everything had to be done by touch. It was a dangerous as well as difficult task. At last they succeeded in freeing the valves, the pump got to work, and the ship was restored to an even keel.

The *Svend Foyn's* troubles were not over. In the words of the captain: "For two and a half days we experienced really terrible weather, heavy storms and a gale from the south-west. I was afraid the ship would break amidships, as the seas were so heavy, and the vessel vibrated a great deal." But this vessel, built on the Tees, was worthy of the seamanship of men trained in the hard school of the Antarctic. The *Svend Foyn* was brought safely into port, with the bulk of her precious cargo intact—now a job for the repairer.

Such were the men and methods that kept the Red Ensign flying.



INTERNATIONAL ICE PATROL

Fig. 1. *After the sinking of the "Titanic" in 1912, the International Ice Patrol was established. Top shows the wide area of the North Atlantic over which the Patrol operates to guard against the recurrence of such disasters, and also the limits of the ice drifts. Lower picture indicates fog areas. The guard ship stands by to warn vessels of the presence of an iceberg*

CHAPTER 8

How Ships Find Their Way

Fixing position by the stars. The first chronometer. Winds, tides and currents. Soundings for depth of water. The magnetic compass. How the gyro-compass works. Improvements in the sextant. The Patent Log. Hurricane perils. Pilots, lighthouses, lightships. Rules of the road at sea. Navigating by wireless, lights and buoys.

"CAN you tell me where I am?" or "Can you tell me how to get to Marbury?"—or some other town or village. How frequently pedestrians or motorists have put such a question to passers-by, though they were in their own country and had well-made roads, with distinctly marked signposts, at their service—at least, in times of peace. Consider the difference when a ship puts out from port, and her captain must find his way over the great waste of waters.

You can better appreciate the vast extent of the sea, and, consequently, how difficult the problems of navigation are, if you keep a few simple facts in mind. The superficial area of the earth is 196,836,000 square miles; only about one-third is land, and the rest is sea.

We speak of the seven seas, but you could say that they are all one, for there are no boundaries as on the land. So how does a ship find its way when it passes out of sight of land? It is very rarely that the captain loses his way, though he has no signposts or roads. He navigates his ship towards its destination with complete confidence that he will get there, and, in these days of steam or motor power, we can make sure of getting there on a certain day, if not at a specified hour.

The sea has its deeps and shallows. Islands standing out of the ocean, level for all to see in clear weather, may be shrouded from sight in fog or mist. Rocks awash at half tide may be covered at full tide, and the navigator must know the exact position of these perils. Coral reefs, marked on the chart (P.D.) to indicate that their position is doubtful, provide yet another snare for the mariner. Icefields of varying size, which move from the North Polar regions southwards annually have to be taken into account. Icebergs which float northward towards Cape Horn from the South Polar regions —some are 20 miles in length—are a very real danger to shipping in the North Atlantic at certain times of the year (Fig. 1), especially in the fog areas.

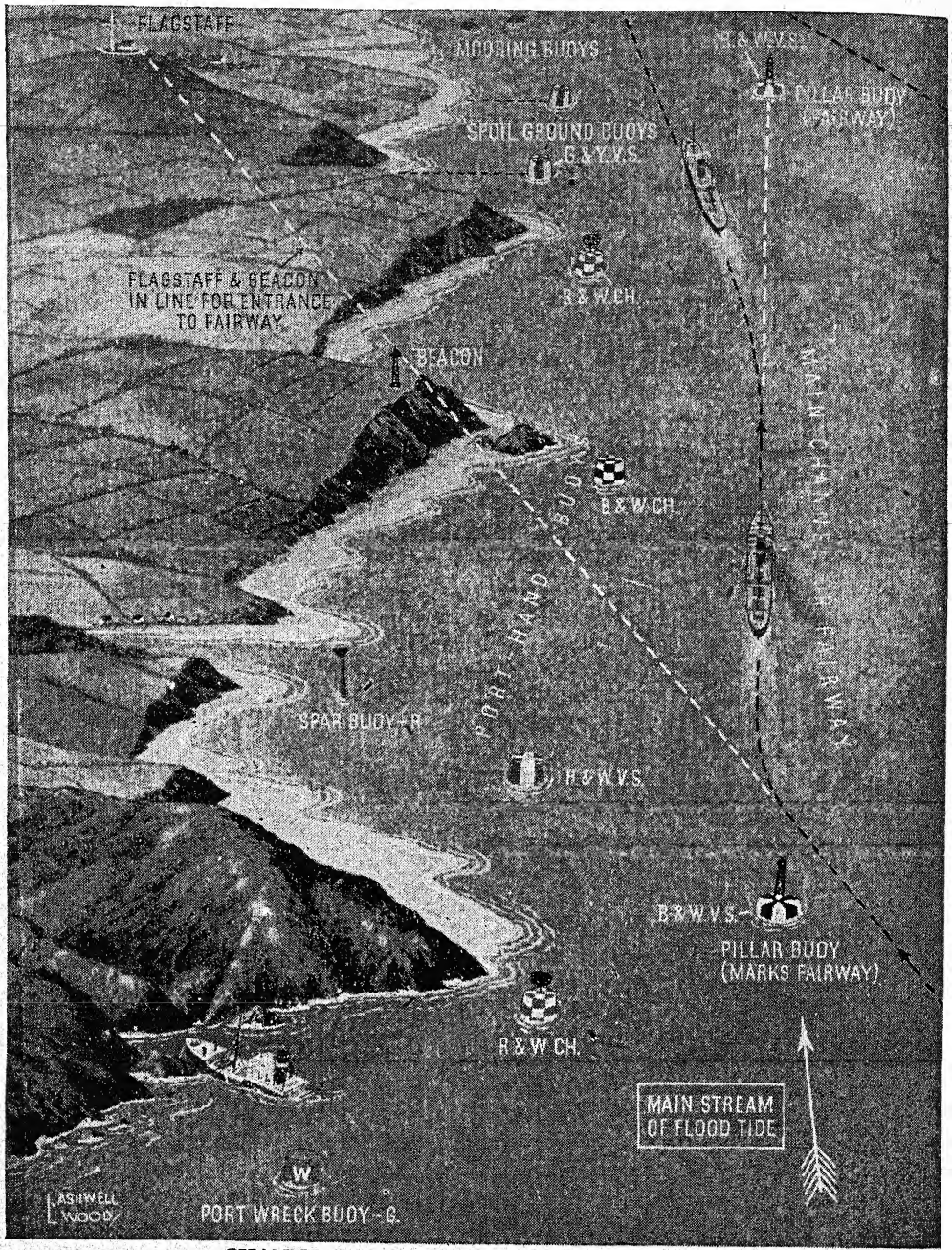
BRITAIN'S LEAD IN RESEARCH

The disaster to the *Titanic*, which sank in 1912 after colliding with an iceberg, led to the establishment of the International Ice Patrol in the North Atlantic.

There are also islands which appear and disappear, such as the questionable Elizabeth Island of Drake, some hundreds of miles west of Cape Horn, which was probably of volcanic origin.

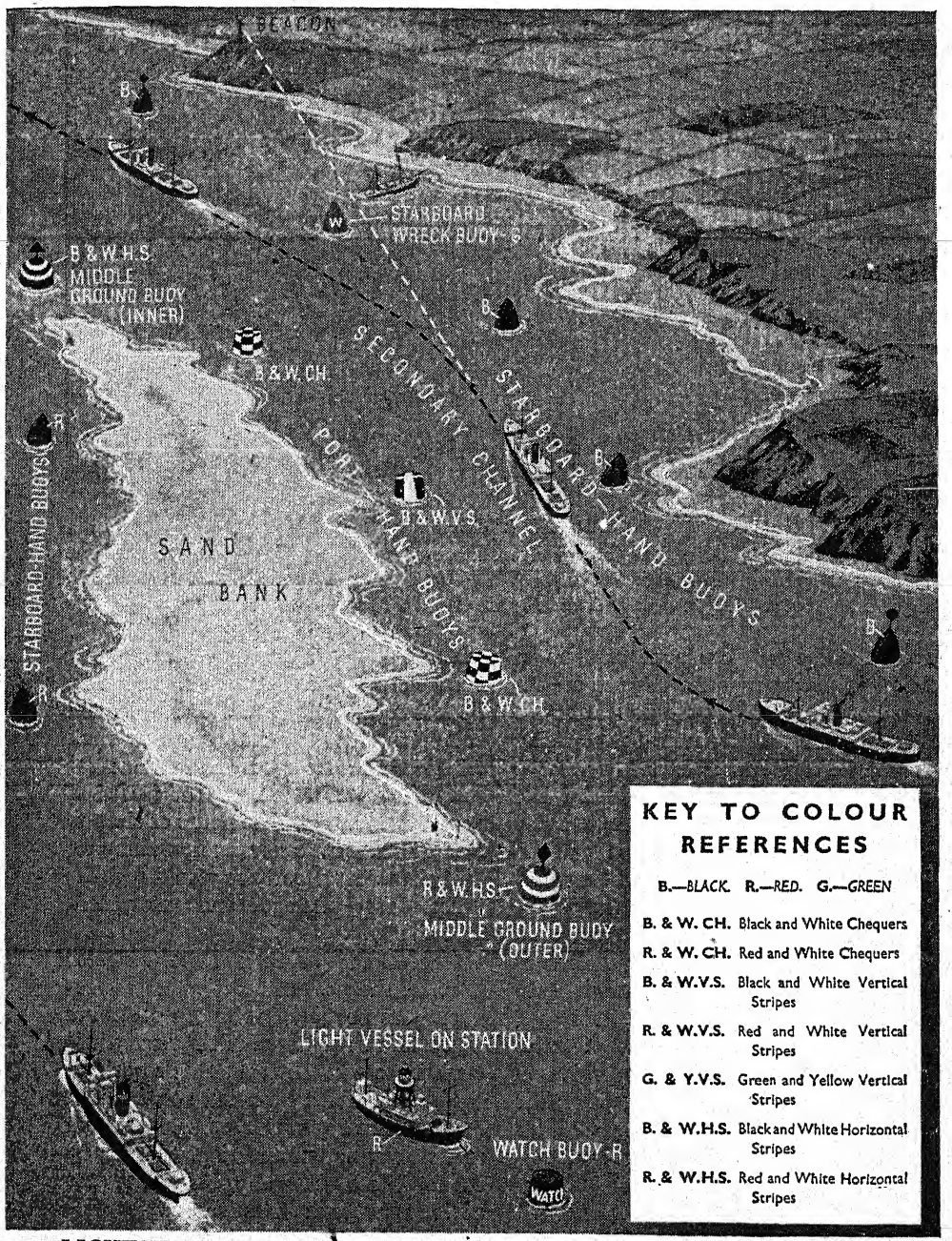
The British nation has expended much money, has devoted much time and research to the scientific improvement of navigation, and this work has been of great benefit to the whole world.

Flamsteed, the English Astronomer Royal and a friend of Isaac Newton,



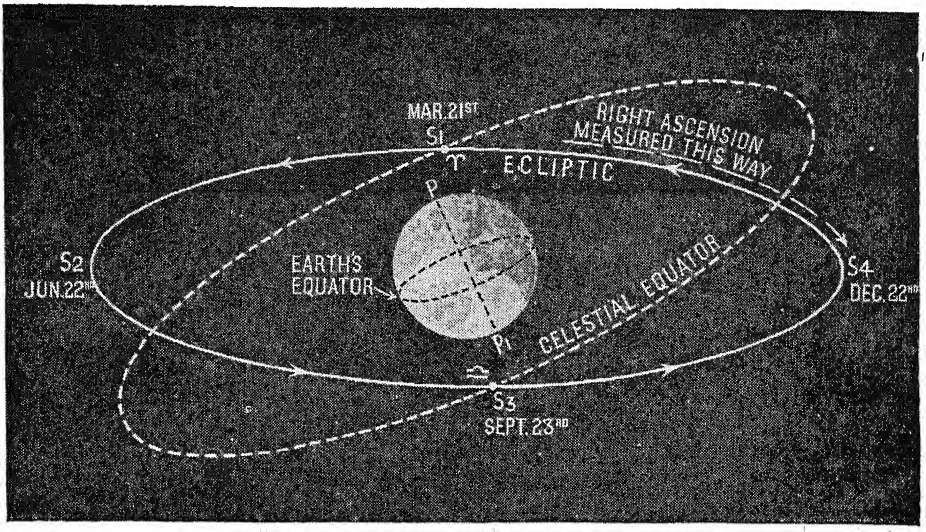
CHANNELS, SANDBANKS, WRECKS, MOORING GROUNDS,

This composite drawing shows how the different types of buoys are placed to help mariners and their ships. As in Admiralty Charts, they are indicated by letters (inset, right). Starboard-hand buoys are always conical in shape, and painted one colour. Port-hand buoys, in two



LIGHTSHIPS, ARE ALL MARKED BY BUOYS

colours, are always can shaped. Middle-ground buoys wear horizontal stripes and are spherical. Spar buoys mark special positions, such as wrecks. Pillar buoys indicate the fairway, and watch buoys tell the position of lightships. Details of all types of buoys are given on page 180



RIGHT ASCENSION

Fig. 2. *A ship's position can be fixed by observations of heavenly bodies. By right ascension of a heavenly body is meant its celestial longitude. The right ascension runs from 0 degrees to 360 degrees, or—as it is usually expressed in time—from 0 hours to 24 hours*

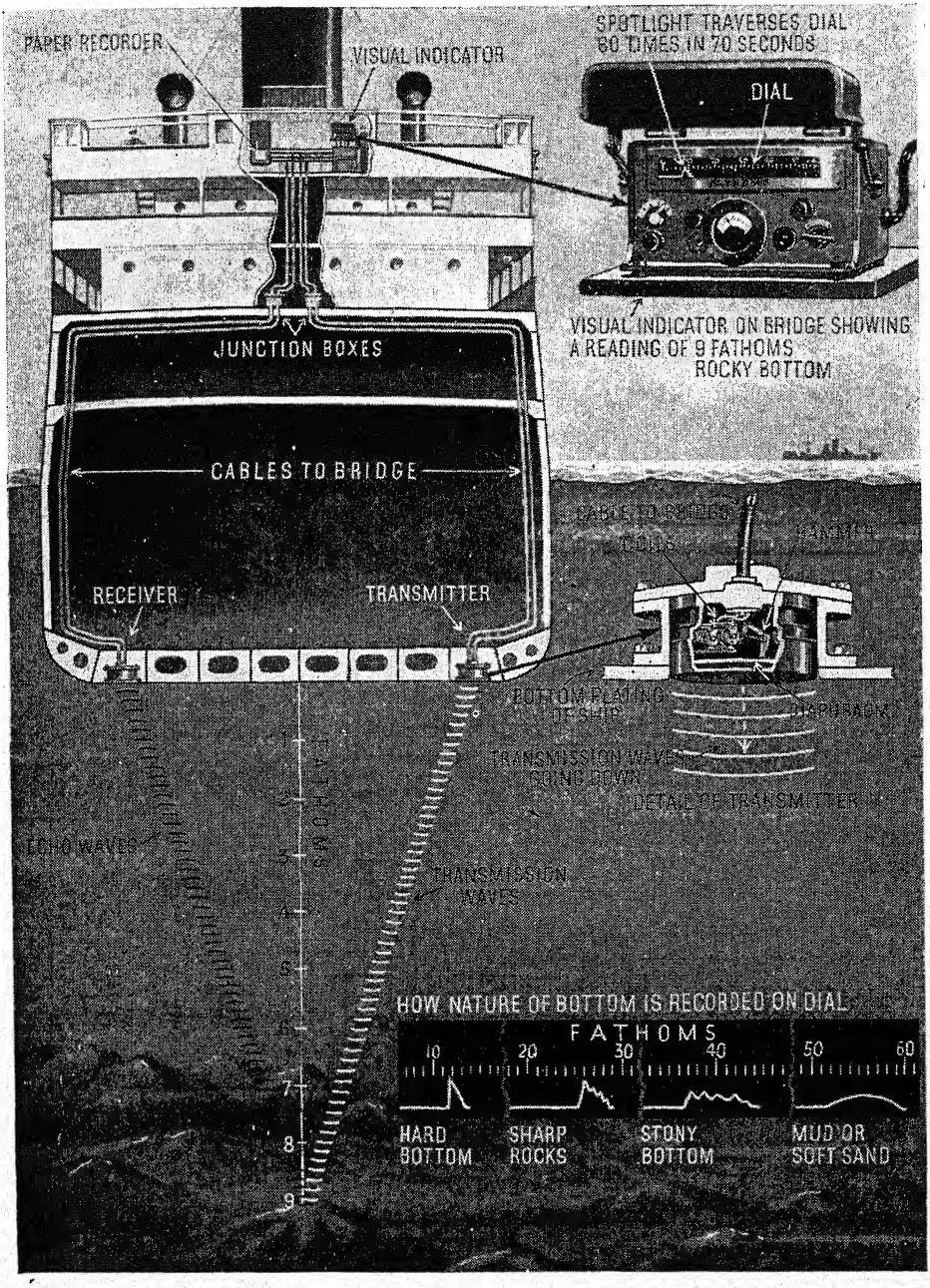
compiled the first catalogue of stars in the English language for the use of seamen. It was, probably, the first extensive compendium of astronomical data. Using the meridian of Greenwich as the zero for measurements, Flamsteed provided not only the magnitude of each star, but also its position from the equator and its position during the day and night east and west of a fixed point. The plane of the earth's equator is inclined at an angle of 23½ degrees to the ecliptic (the plane of the sun's apparent path). The right ascension is measured eastwards in hours and minutes from the first point of Aries (Fig. 2), which is used as a meridian on the celestial sphere just as Greenwich is used on the earth. Owing to the earth's rotation, the whole celestial sphere seems to rotate about the celestial axis.

FIXING SHIP'S POSITION

Flamsteed's list of stars became the *Nautical Almanac*, a title it still retains. He gave to seamen the Prime Meridian, which was copied by the French, using Paris, and by the Russians, using St. Petersburg. The United States and other countries followed, and adjusted their clocks to the required time. When the sun is rising at New York, the citizen of San Francisco has three hours of sleep to come. If he were a navigator, waiting for daylight to enter port, he would regulate orders for pilotage and movement accordingly.

The primary concern of the navigator is to fix the position of his ship as frequently as possible. When log books are called for in the Court of Admiralty it is essential to prove that the ship's position has been obtained by reliable observation at noon each day of the passage. At dawn and dusk also, observations should be taken. When navigating a coast, the position by land fixes should be frequently taken to avoid dangers.

At sea, when out of sight of land, both latitude and longitude must be found in order to obtain the position of the ship by



AUTOMATIC RECORDS OF DEPTH OF WATER AND NATURE OF SEA BED

Fig. 3. *This apparatus electrically records depth of water under a ship, and shows the nature of the sea bed. An electrically controlled hammer strikes a diaphragm in the transmitter. The impulses pass to the sea bed, return to the receiver, and are recorded on the bridge*

the intersection of their two lines. These "lines of position" are obtained by observing the altitude and position of two or more stars. In coastal navigation a "fix" is obtained by cross-bearings, two, or more, points of land being used to do this. It is obvious that both these operations amount to the same in effect, and are fundamentals in navigation.

SAILING BY THE POLE STAR

The Vikings, who before A.D. 1000 were covering voyages exceeding 2000 miles, did not trouble about longitude: they used the land to give them their "eastery" and "westery" landfalls. Probably they observed the Pole star for latitude on their many voyages from Bergen to the Shetlands, Faröe Islands, and Greenland, because this star has the distinction, not available for the help of the mariner in any other star of such magnitude, of giving the latitude in degrees approximately according to its elevation. That is to say, if you are in the latitude of 40 degrees north, about the latitude of New York, the Pole star will be riding the heavens 40 degrees above the horizon level. This ready check was known to the Alexandrians and, later, to the Moors, who were navigating long before the Vikings.

Magellan and his successors found the need for determining longitude. Our Elizabethan seamen, Drake, Davis and others, developed the practice of taking simultaneous observations of two stars.

There was great need for some form of watch to gauge the correct intervals of time, and mark the difference of longitude. In 1766 the British Government offered a reward for a clock capable of maintaining a very high standard of correctness for navigation. The result was a chronometer designed with a compensation balance to meet changes of climate. It was invented by John Harrison, of Yorkshire, who received £20,000 for his ingenuity. At this time Captain Cook was preparing for one of his many long voyages of discovery.

The British began seriously to survey the Seven Seas in 1795, in which year the Hydrographic Department of the Admiralty was formed. Since that date it has grown to be the largest organization of its kind in the world, producing charts, sailing directions, and the most complete information possible of winds, tides, and currents in every part of the globe.

England, always in the forefront of maritime discovery, ultimately laid down the method by which the time of tide (high water), and height of tide (level), could be predicted, and issued tide tables for the use of mariners. Later, Professor William Thomson, who became Lord Kelvin, invented and patented a machine for the easy prediction of these elements without figuring out details by mathematics. This revolutionary achievement enabled tide tables to be prepared for all parts of the world.

Lord Kelvin again came to the help of sailors with a method of ascertaining the depth of water. Measurement in deep water was not only a laborious operation, but sometimes required that the ship should be stopped, and caused delay.

LORD KELVIN'S DISCOVERIES

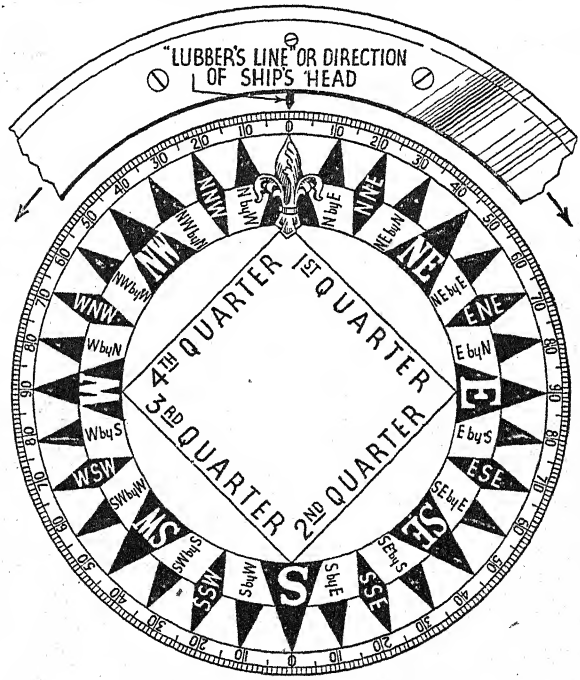
Lord Kelvin coloured sounding tubes with chemical solution, and the pressure of water, as the sounding-lead descended, caused the tube to become changed in colour and so to represent the increase in depth. His sounding machine enabled vessels, proceeding at speed, to take deep water soundings without stopping. For thousands of years, in his dugout, raft, or sea-going vessel, man had been using a line with a weight attached, but all this was changed by the practical application of the new method. In the years that followed deep-sea sounding became the subject of much intensive research.

During the voyage of H.M.S. *Beagle* (1831-36), oceanography—the science which deals in detail with the depths of the ocean—was made the subject of special study by Charles Darwin, who reported many profound matters with a most valuable simplicity.

About the year 1909 some American engineers, by using a Fessenden oscillator, found it possible to gauge the depth under a ship by sending a note downwards and listening for the echo, much as one can do in the atmosphere where there exists a wall or means for creating the reverberation to reflect the sound. What was wanted was an accurate method of measuring the depth or distance. Acoustic sounding had been born. In the research that followed the first World War, the British Admiralty produced the echo sounder, by which a hammer sent out a note receivable on a measuring dial actuated by an electric current (Fig. 3). Variation of depth could be known by the rise and fall in the hammer notes with variation of speed. An ordinary loudspeaker trumpet was used in these early stages, and even in shallow water the depth could be measured within three feet. In 1924 the Port of London Authority fitted one such machine, made by Henry Hughes & Son, in their survey ship *St. Katharine*.

From the acoustic to the non-acoustic has been a short step. It was quickly found by trial and error that it was not necessary to hear the note at all, as a high-frequency electrical impulse, noiseless yet more accurate in its behaviour, would register without noise. Moreover, it could be connected to a make-and-break light, as is done with another type, and be made to indicate the depth visually on a scale. A roll of photographic paper, set moving during soundings, gives a permanent record.

The Magnetic Compass deserves a place of honour to itself, for it is as indispensable as the seaman's anchor, which holds a ship fast when the engines are stopped, or the sails are furled. When the ship is under way the compass indicates;



POINTS OF THE COMPASS

Fig. 4. *There are thirty-two points of the compass—four cardinal points: N, S, E, W; four half cardinal points: NE, NW, SE, SW; eight three-letter points: NNE, ENE, etc.; sixteen "by" points: N by E, NE by N, etc. In the compass there are 360 degrees, which are divided into quarters of 90 degrees each. One point = 11¼ degrees*

(*a*) the direction in which the ship is going, (*b*) the positions of headlands, buoys, lights, sun, moon and stars. All these are measured on a horizontal circle with reference to the North-South line.

The compass is constructed on the principle of suspending magnets in such a manner that, remaining horizontal, they are free to take up the direction in which the magnetism of the earth draws them. This direction is termed the magnetic meridian. A circular compass card is fixed to the compass needles, or magnets, and divided into four quarters of a circle—North, South, East, West. Each quarter is divided into eight equal parts called points, making thirty-two points of the compass (Fig. 4). The edge of the card is graduated into 360 degrees. Dry card compasses are used for ships where shock is not severe, but where heavy guns are discharged the compass card is confined in a bowl containing spirit, thus reducing vibration. The compass itself is mounted on gimbals, so that in bad weather, however much the ship may roll or pitch, the compass continues to remain, as it were, on an even keel.

PRINCIPLES OF GYRO-COMPASS

The gyro-compass is a later development. This instrument has the same utility as the magnetic compass from the seaman's standpoint, but, whereas the magnetic compass does not require energy to make it useful, the gyroscope is of no use without that energy. Like a top, it must be started spinning, and like a hoop speeding along the surface of a road it remains on its course, travelling in a straight line, as long as it has momentum. If a force is impressed at the top of the right-hand side, the hoop then travels to the left and falls over to that side; to correct it again a force must be impressed at the top left-hand side. This movement in the hoop is reproduced in the gyro-compass, and is known as *precession*. The gyro comes under the laws of rotating bodies, which state that "Any rotating mass, such as a spinning wheel, tends to swing round so as to bring its axis of rotation parallel to that of any externally applied force, and in such relation that its direction of rotation is the same as that of the applied force" (Fig. 5).

With the gyro-compass the applied force is that of the earth revolving about its axis. At the equator, where the earth's directive force is at maximum, the gyro-compass points true North, but, as a ship with a gyro-compass changes latitude, the directive force lessens until it becomes nil at the Pole. The adjustments of the gyro-compass may be found in the handbooks dealing with this instrument.

CHARTS AND THEIR USES

Gyroscopic control, to keep a ship, or an aeroplane, on its course, belongs to the same field of research that developed fire control and torpedo directors in the navy. An advantage the gyro-compass control has over the magnetic is that the former is not affected by electrical or magnetic disturbances of the earth.

For very many years the compass existed without the chart, but today, in first-class navigation, consideration of the chart is indispensable for a proper answer to the question: "How do ships find their way?"

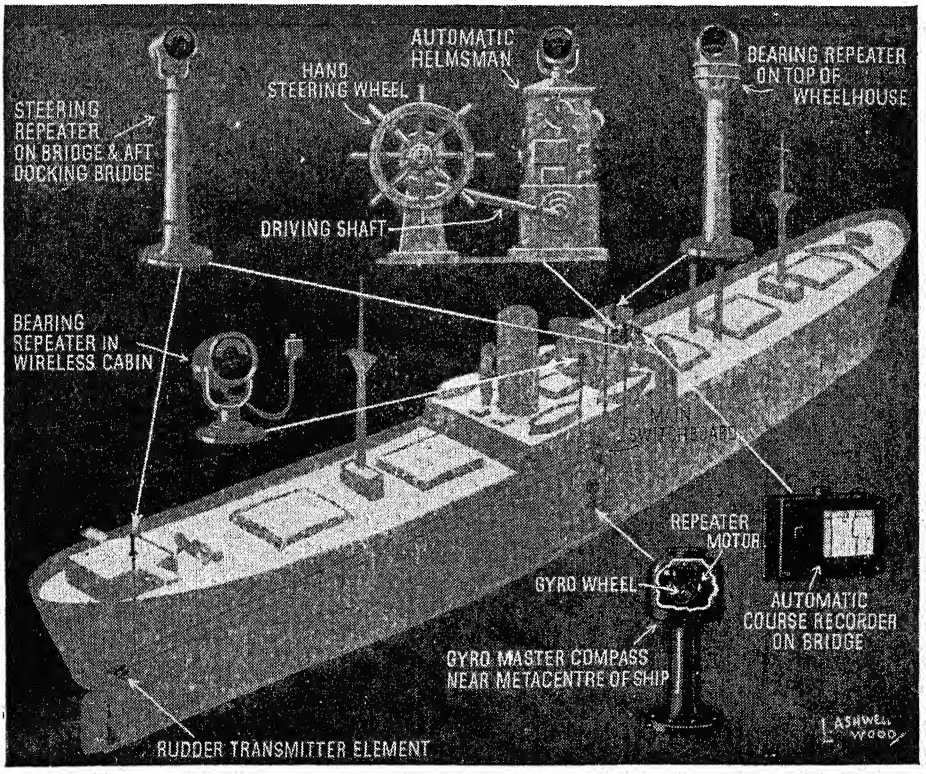
The chart is a representation of part of the earth's surface—it also has the depths of the sea marked on it. It shows capes, islands, headlands, and topography. As the earth is an oblate spheroid —i.e. it is round but flattened at the poles —the flat surface of a chart cannot show the curvature or rotundity. So for many years navigators had difficulty until Mercator, the Flemish geographer, invented his system of projection which showed the meridians of longitude parallel and not converging. In the new method the convergence was compensated for by adjusting the lines of latitude according to the curvature correction.

Mercator's chart was invented as long ago as the sixteenth century, but it still holds favour with navigators.

The sextant is now an essential part of a navigator's equipment, and is the principal instrument used in finding positions at sea. The position of ships may be fixed by means of direction-finding wireless bearings transmitted from suitable stations on land, but these are not infallible, and the ship's receiver may become damaged, whereas the sextant, a more durable instrument, can be subject to much hard wear and tear without injury.

The sextant is used to measure angles of sun, moon, or stars on the vertical or horizontal planes—or even at oblique angles. For horizontal angles it possesses an accuracy greater than a 6-inch theodolite. Since the radius of the sextant is greater, the subdivisions can be bisected to ten seconds of arc—which is hardly possible on a small theodolite.

During the past thirty years improvements in sextants include: (1) greater telescopic range for star operations; (2) the micrometer method of reading the Vernier subdivisions; (3) wider field of observation. In the matter of accuracy let this fact be considered. The writer has, in co-operation with other officers (their observations being averaged), fixed by sextant the ship's position within 300



THE GYRO-COMPASS AND MECHANICAL PILOT

Fig. 5. *The gyro-compass is operated by the rotation of the earth and points to the north. A gyro-wheel spinning at high speed has a strong tendency to maintain its axis in a fixed direction—this is made to coincide with true north. The automatic helmsman keeps the ship on a straight course. From the master compass repeaters constantly indicate the direction of the ship's head*

to 400 yards of the precise measurement by taut wire during cable-laying operations in the Atlantic.

To use the sextant, one has only to remember that the angle at which a celestial object strikes down at the mirror of the sextant (angle of incidence) is equal to the angle measured to the horizon (angle of reflection). Hence, the observer must look steadily at the horizon, moving the index, or mirror, arm until he finds that he has the vertical dimension. He then clamps the arm to the arc and, turning the sextant face upwards, reads the degrees on the arc and the minutes and seconds on the Vernier (Fig. 6).

The ship's chronometer (Fig. 7) is used for determining longitude. This it does with great accuracy owing to Harrison's invention (1766) of a compensation, or expansion, balance to meet changes of temperature. It is a specialized clock which carries Greenwich Mean Time to any part of the world, and also fixes longitude at sea.

The difference between a ship's time in mid-Atlantic and the chronometer time is longitude because time in hours, minutes and seconds is convertible into degrees, minutes and seconds of arc by the equation that one hour of sun travel is equal to 15 degrees of longitude. Therefore, when it is noon at Greenwich, it is only 11 hours a.m. at 15 degrees west longitude. There is the rhyming rule:—

Longitude East Greenwich time least
Longitude West Greenwich time best

WHY SHIP'S TIME CHANGES

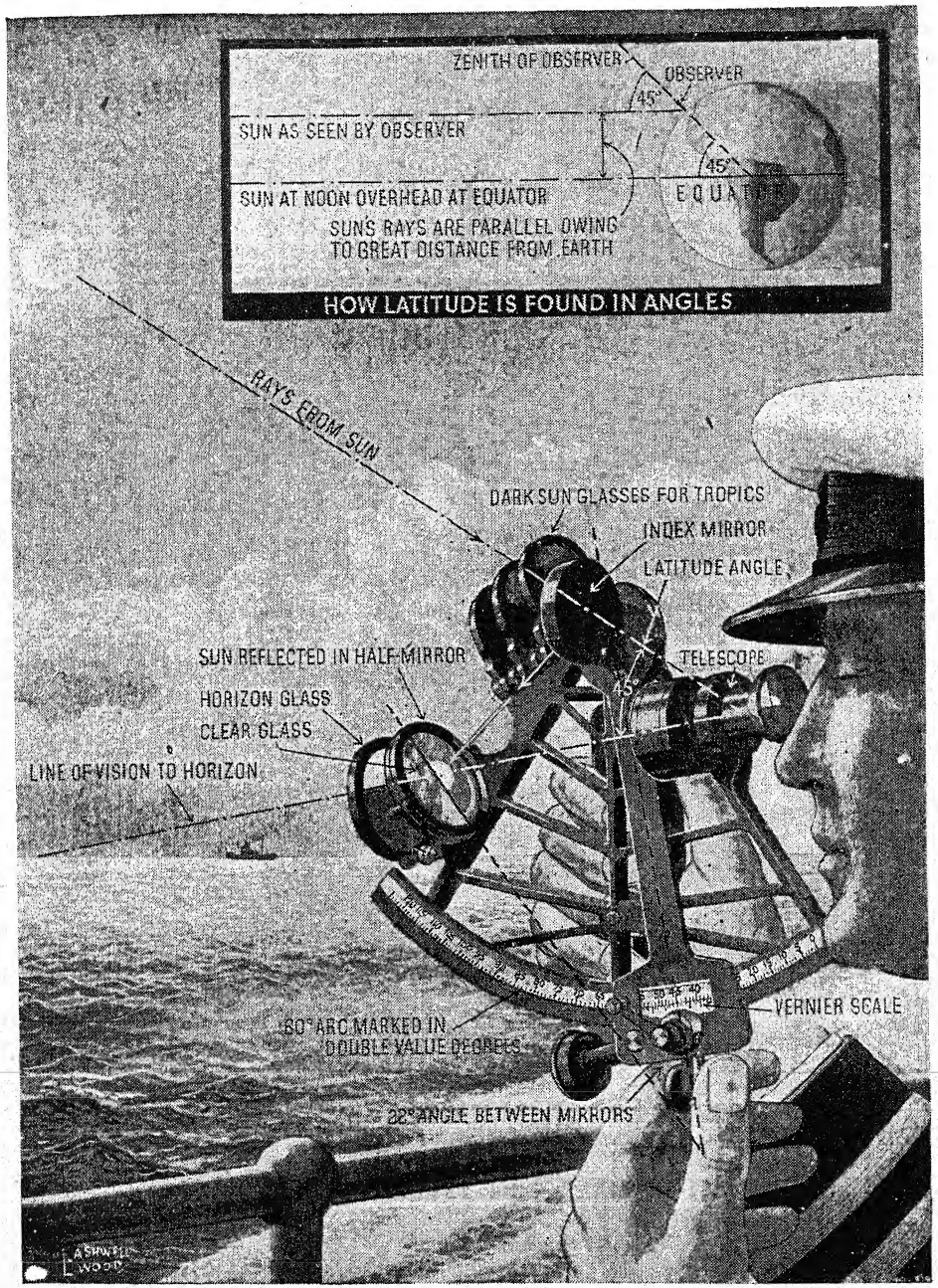
The navigator, like the tailor, chops off or cuts up as much as he requires for his navigation. When travelling westward, he is moving towards the setting sun. He is going to places where noon is always later than at Greenwich. When travelling eastward, moving towards the rising sun, he finds that his clock, adjusted for longitude, is showing noon to be earlier than Greenwich.

In order that we shall not turn day into night we have to put our ship's clock right at least every twenty-four hours, if not more frequently, while keeping the chronometer at Greenwich Mean Time. Thus, we are stealing a march on the sun —owing to the earth's rotation from left to right—and in travelling or flying around the world eastwards we gain twenty-four hours on the clock as compared with the time when we left Greenwich. This gain of clock time was used by Jules Verne in his famous story-book, "Around the World in Eighty Days." The traveller, on reaching Westminster, thought he had nearly lost his wager, only to find that, owing to this gain in time, he had done the journey in seventy-nine days, thus winning the wager with a day to spare.

HOW THE LOG WORKS

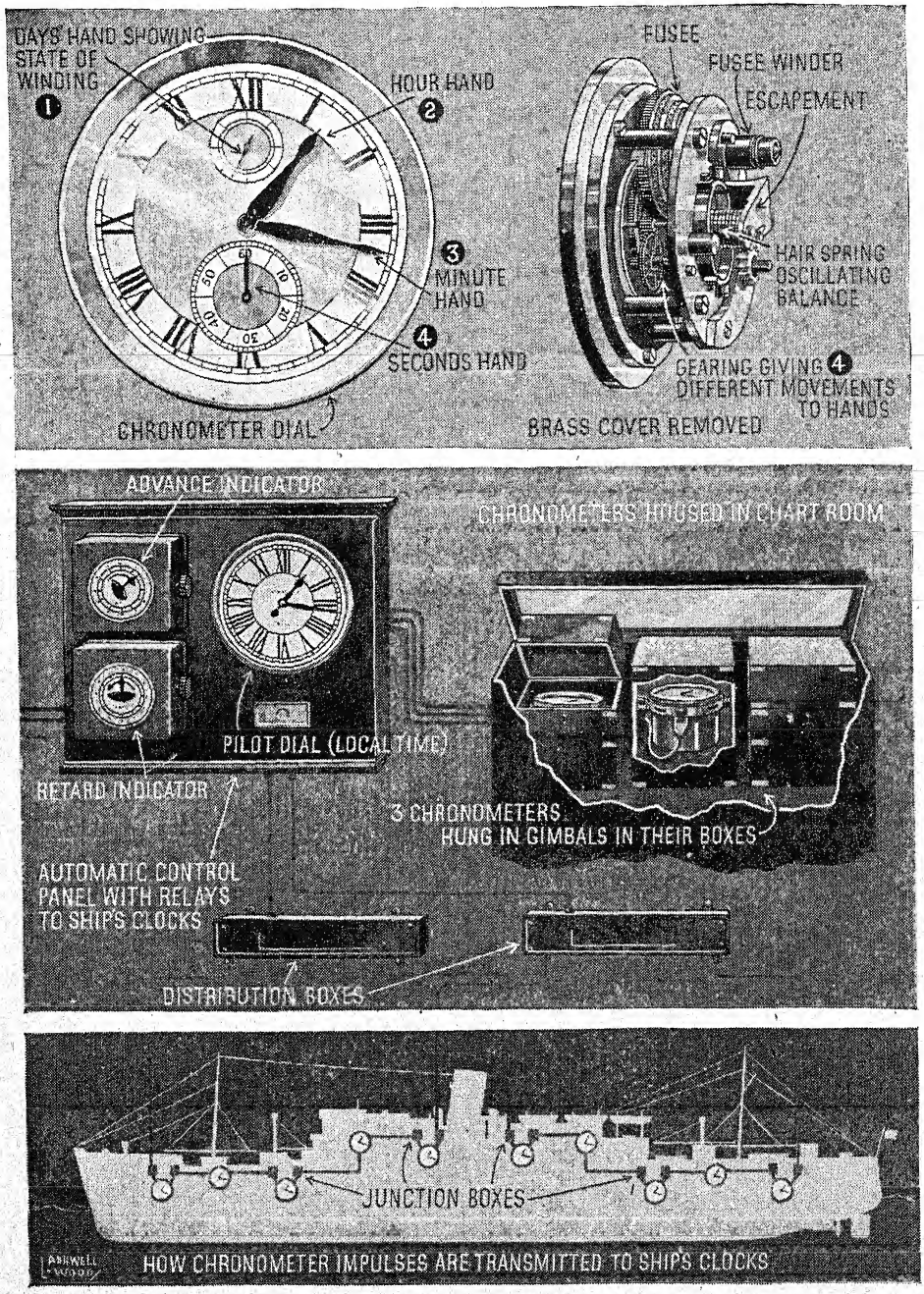
Ships are able to measure their passage through the water by means of a rotating propeller-like metal contrivance attached to a specially woven line. This line does not twist, but imparts to a clock on the stern of the ship a number of revolutions according to speed. This is called the Patent Log. The propeller, or rotator, is streamed so as to keep fairly in the water at distances varying with the type of ship. The clock is read regularly, usually every two hours, and the distance noted in the log-book.

Patent Logs also operate from tubes in the bottom or sides of a ship, in which case the pressure due to speed is the registering factor (Fig. 8). A handicap with this type, however, is its tendency to become weed-grown and choked. Before the invention of the Patent Log, sailing ships used a sand-glass, which measured the seconds taken for a line to run out, the line having knots to mark the speed at which the ship was moving. Hence the term "knot," which is used to denote the number of nautical miles covered by a ship in one hour. When we say a ship is



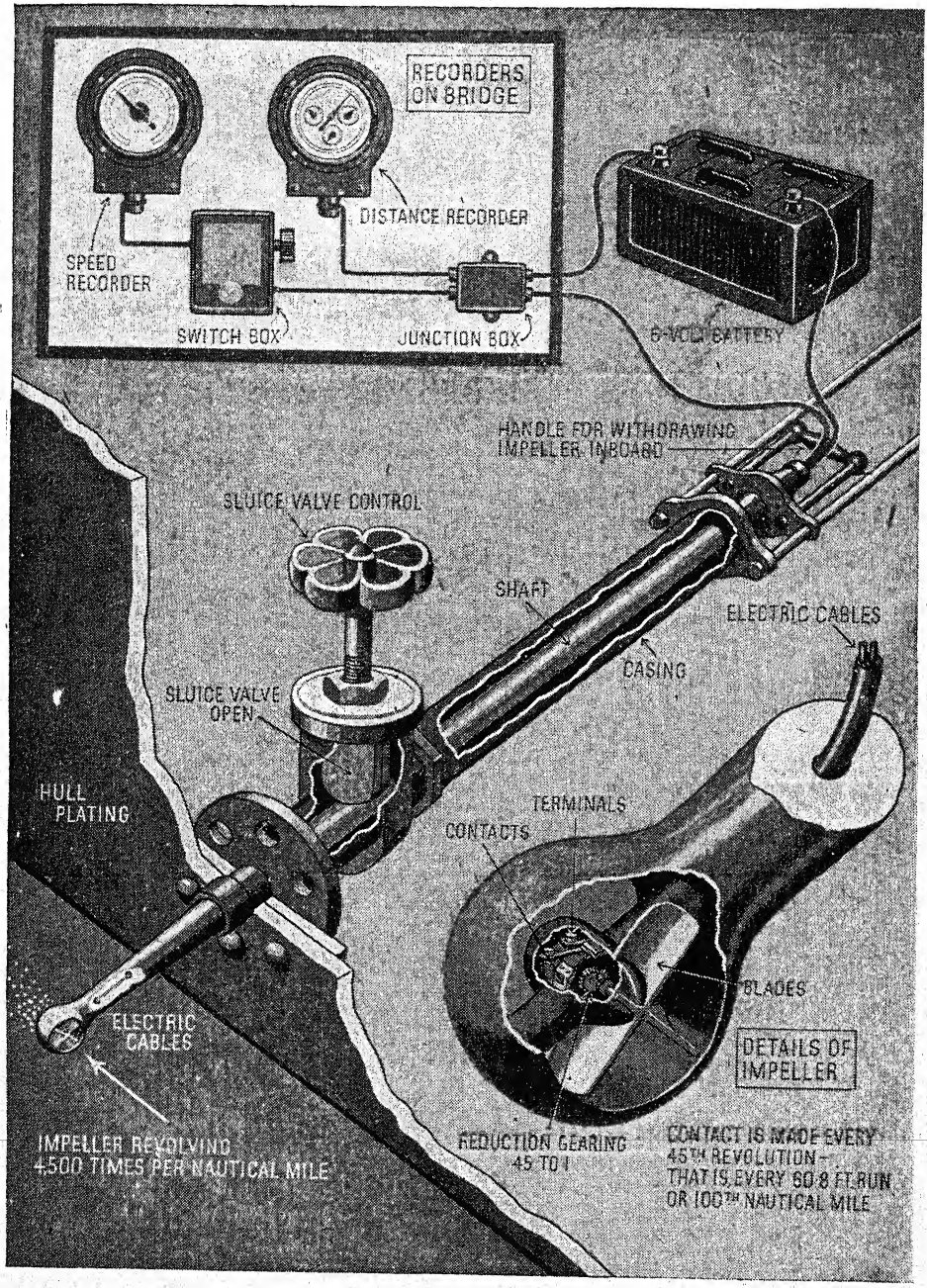
FINDING LATITUDE FROM THE SEXTANT

Fig. 6. *The sextant, so called because its arc is one-sixth of a circle, is used to measure the altitude of the sun. Obtaining the angle as shown above, the mariner finds his latitude. Inset is shown latitude of 45 degrees when the sun is overhead at noon at the equator*



DETAILS OF SHIP'S CHRONOMETERS

Fig. 7. *British chronometers are wonderfully accurate—an error of ten seconds a month being the only rectification needed. Used with the sextant, the chronometer gives exact longitude*



SPEED AND DISTANCE MEASURED BY PATENT LOG

Fig. 8. *This new electric ship's log gives a continuous record of speed and total distance run by measuring in units of rotation the distance run at any speed from zero to 40 knots*

steaming twenty-one knots we mean that she is covering twenty-one sea miles in one hour. To say "knots per hour" is wrong.

With the instruments and appliances which have been described, let us now set out on a voyage from a West Indian port. Our ship is bound for London.

Pilotage is usually compulsory in foreign ports, and the master, or his agent, orders the pilot on board when the ship is ready for sea. The orders of the pilot rank as the orders of the master. In deep water outside the harbour the pilot is dropped, and we are well started across the Pacific on our four thousand miles journey from Jamaica to London.

HURRICANES AND CYCLONES

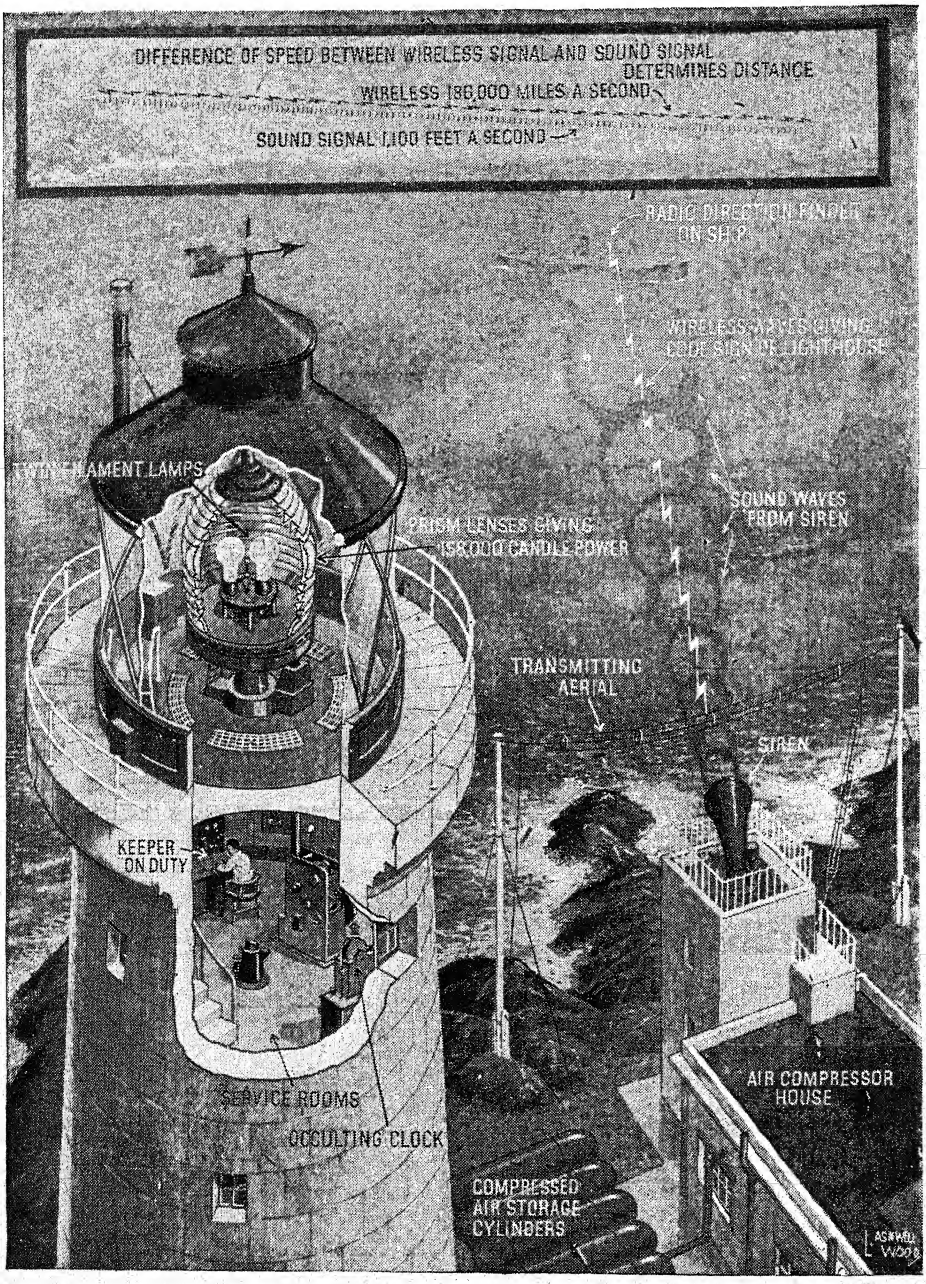
Notwithstanding the robust build of ships, weather must always be considered, especially in the hurricane seasons. Hurricanes may be encountered in the vicinity of Rodriguez and Mauritius, or in the West Indies. Cyclones are encountered in the Bay of Bengal, and typhoons in the China Seas. The writer was at Bermuda when H.M.S. *Aeolus* was caught in a hurricane in the West Indies. It was eight bells (noon) and the crew were about to start dinner. There was no dinner on board H.M.S. *Aeolus* that day, for the hurricane threw the ship on her beam ends in a welter of livid foam. She was saved, with great difficulty, by the superb seamanship of Captain Northan, her commander. In the year 1937 a liner navigating the Caribbean Sea became involved in a hurricane which uprooted the funnel, carrying it overboard, together with all deck fittings. The heroic efforts of an apprentice, who crawled from place to place about the stricken vessel in order to stop the inwash of water, contributed to the saving of the ship.

So the mariner finding his way must have good knowledge of the path and velocity of hurricanes. Hurricanes are rotary storms. In northern latitudes they rotate left-handed (or anti-clockwise) and in southern latitudes in the reverse direction. The velocity of the wind in its rotary motion may reach 150 miles per hour, but about 100 miles per hour is more general. Meanwhile, it is progressing on a track which has geographical limitations at the rate of 200 miles per day, but a thousand miles per day has been proved as a possible onward movement. As you can imagine, in the centre of this storm—the vortex—the sea is like a boiling cauldron, rising and falling in pyramidal confusion, magnificent but terrible. Very few ships can survive it.

To avoid the dread danger of the vortex, laws of storms must be known and contact maintained with meteorological centres locally. These storms originate between latitudes 10 and 20 degrees north and south, and on reaching latitudes 20 to 30 degrees recurve and peter out as they travel northwards and southwards. Trinidad escapes the North Atlantic hurricanes which reach Jamaica in the heart of the Caribbean. As they pass over the islands they devastate the vegetation, tear up dwellings as if they were cardboard, and cause incredible damage. The season for these hurricanes in the North Atlantic is between July and October.

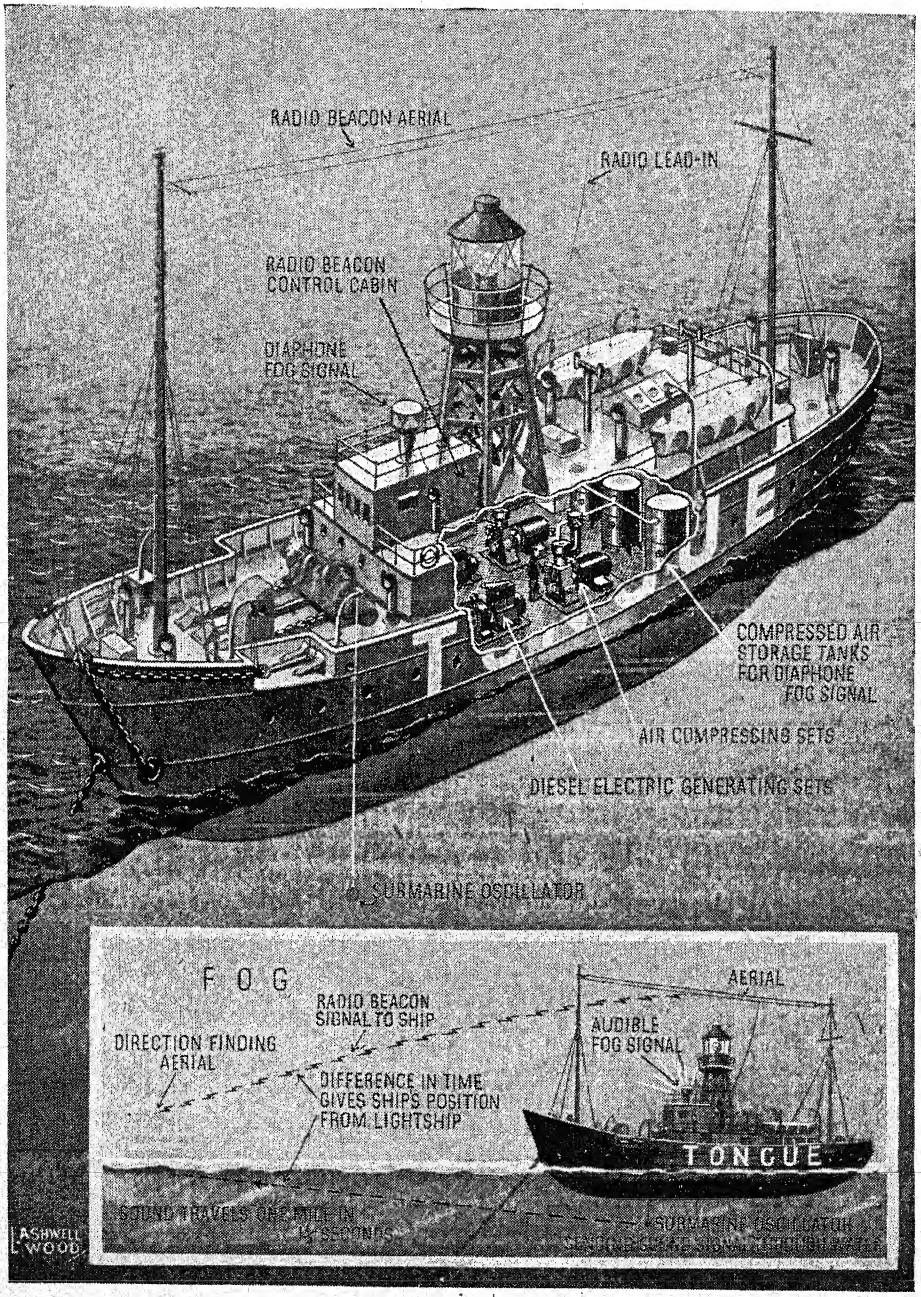
DANGEROUS CURRENTS

Ships sailing coastwise have special points in navigation to consider. It is near the land that currents are most unreliable. For instance, in the Bay of Fundy, Canada, the range of tide may exceed forty feet, which causes a great indraught on the flood tide. Therefore, a look-out must be kept for the coastal lights, and the ship's position checked when the lights are observed. The lights vary considerably in power, according to the position of the lighthouse. If the position commands the approach of shipping the candlepower of a lighthouse, such as that at the Lizard in Cornwall, for example,



RADIO AND SOUND WARNINGS TO SHIPS

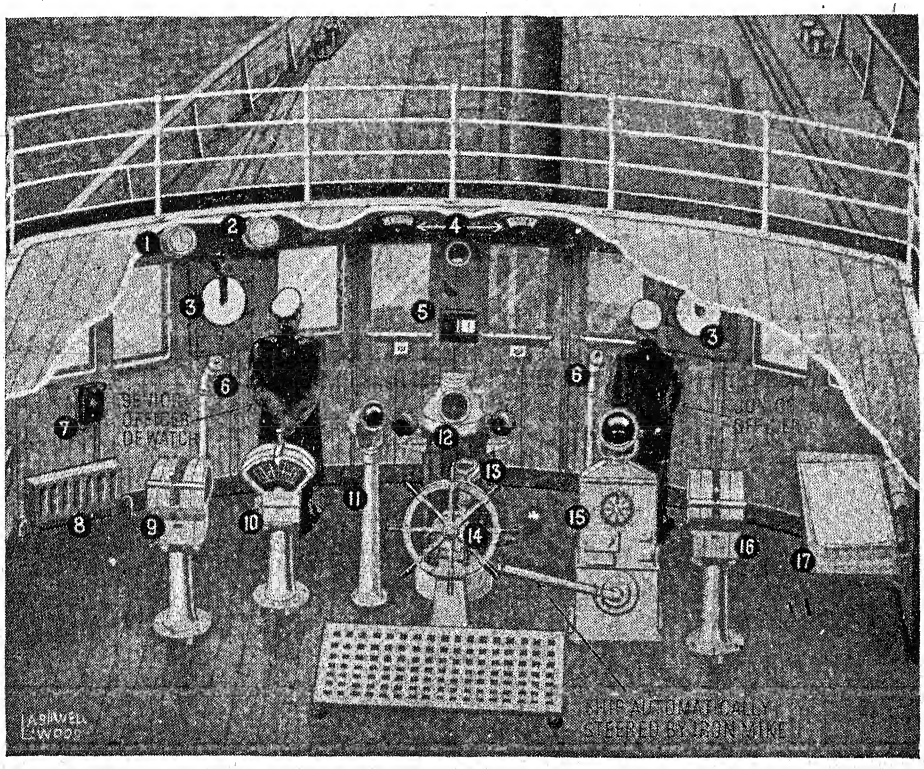
Fig. 9. *Lighthouses warn ships in fog by an automatic recorder which broadcasts the code sign of the lighthouse every 70 seconds. Three blasts are sent out on the fog siren, and the difference of speed between radio and sound warnings enables navigators to fix distances*



LATEST TYPE LIGHTSHIP WITH SUBMARINE OSCILLATOR

Direction and distance in times of fog can be obtained from some lightships. The ship receives a warning radio signal in code, and morse dashes every 1¼ seconds are counted. Upon receipt of submarine oscillator signals the distance is known, as every dash represents a mile

may be of several millions, and the distance at which it is visible about 25 sea miles on a clear night. In less important positions, lights of lesser power are used (Fig. 9). By means of the Sun Valve, the lamp, when clear daylight comes, can be automatically extinguished. Conversely, they are employed, however, in special positions which demand a number of lights, when distinguishing characteristics for beacons or buoys are essential. Group-flashing lights, in which two or more flashes are separated by varying intervals of darkness, are used. One of the



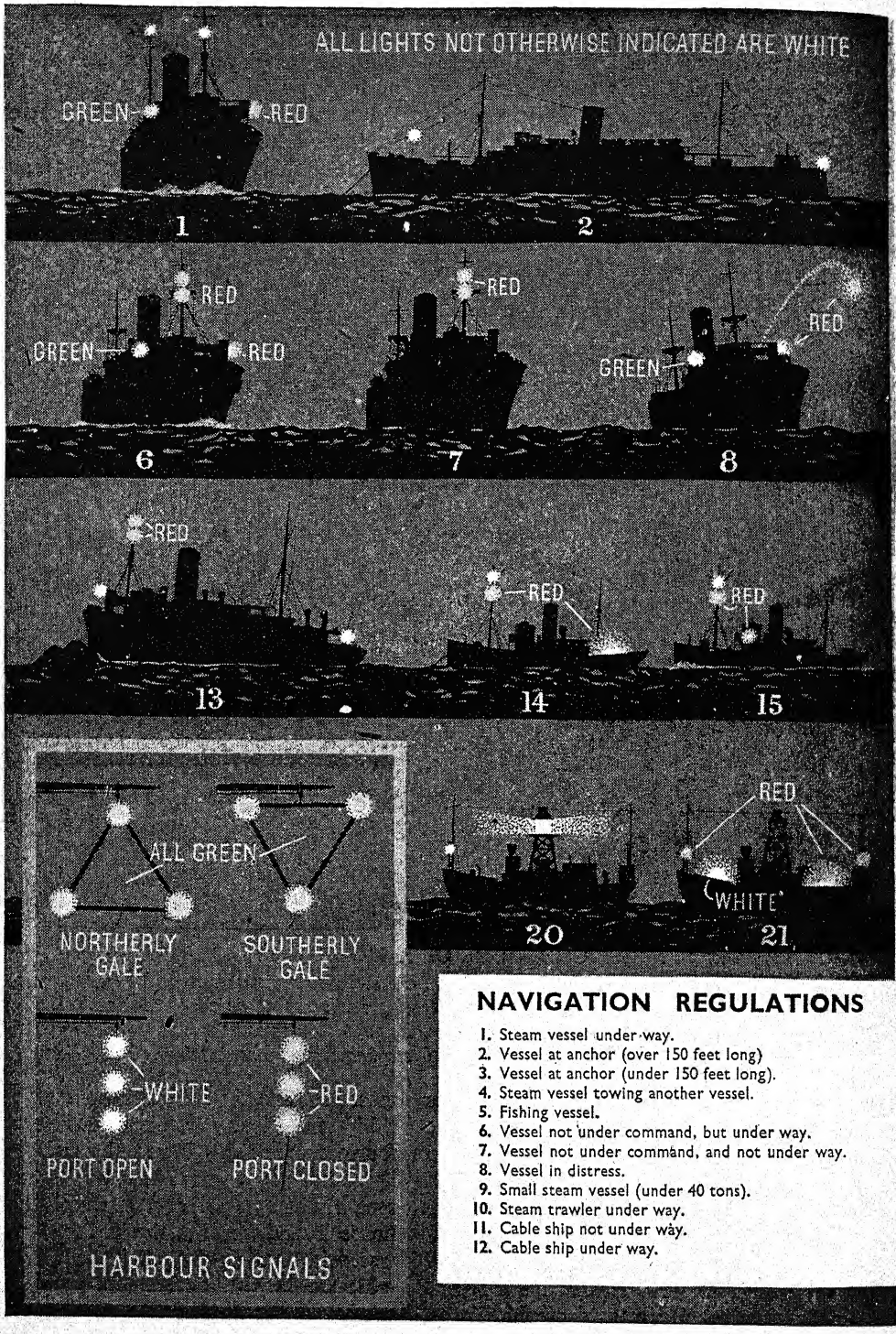
EQUIPMENT ON BRIDGE OF A MODERN MERCHANT SHIP

1, Local time; 2, Greenwich time; 3, clear view screens; 4, revolution indicators; 5, course recorder; 6, voice pipes; 7, telephone; 8, heating radiator; 9, port engine-room telegraph; 10, docking telegraph; 11, gyro steering repeater; 12, magnetic compass; 13, rudder indicator; 14, hand steering; 15, automatic helmsman; 16, starboard engine-room telegraph; 17, chart table

it can be arranged that the lamp becomes illuminated when darkness falls. The ship's position off the coast can be fixed by means of bearings of lights, used as cross bearings, just as in daytime headlands are used for the same purpose.

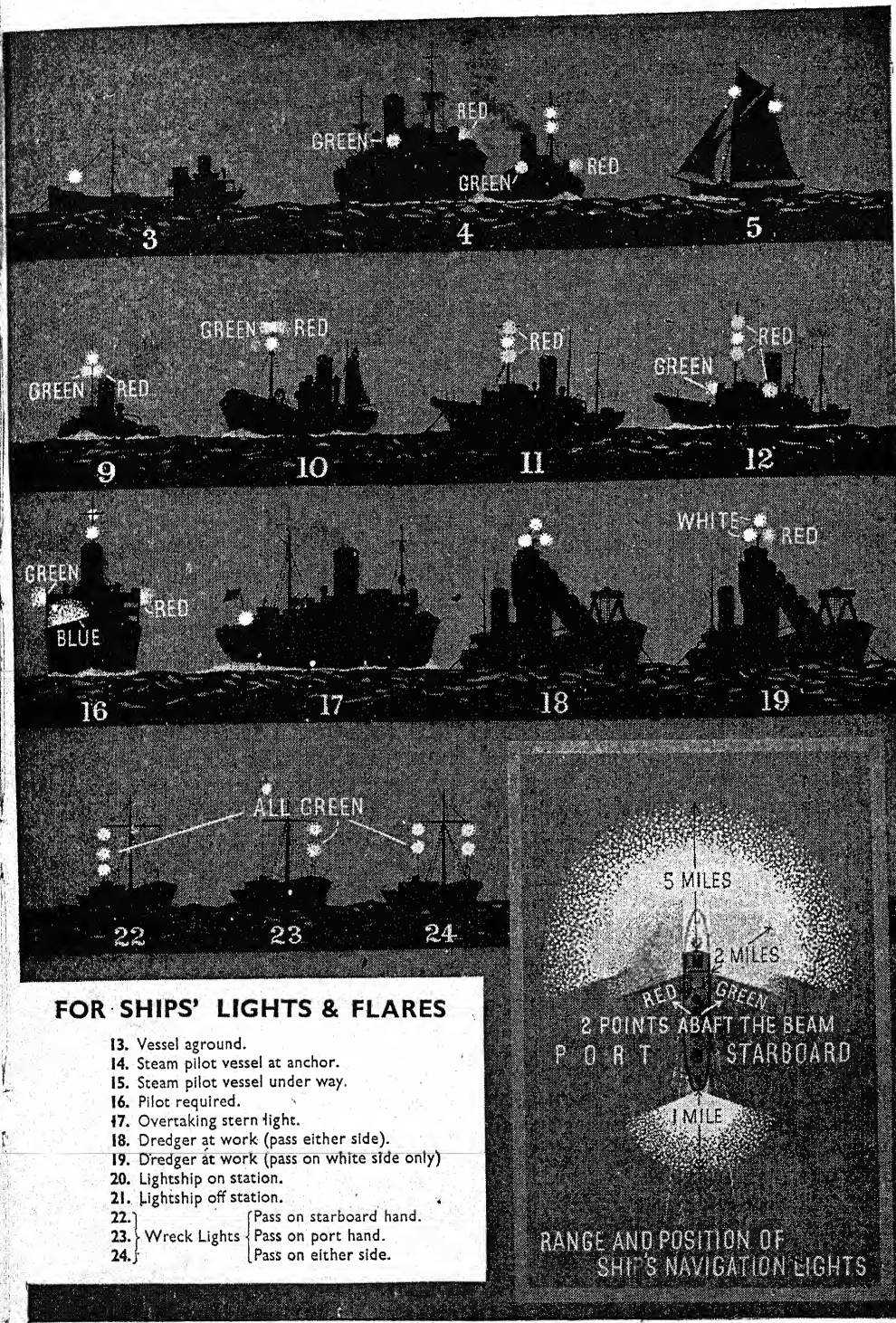
Coloured lights in lighthouses are used as little as possible, for the simple reason that they lack the intensity of white lights. most famous of Britain's lighthouses is the Eddystone. The Eddystone rocks lie about fourteen miles off Plymouth, and four lighthouse towers have been built on the reef. Probably the most exposed lighthouse in the world is the Bishop Rock, westernmost rock of the Scilly Isles.

Before the 1914-1918 war it was found possible to use wireless telegraphy for the



NAVIGATION REGULATIONS

1. Steam vessel under way.
2. Vessel at anchor (over 150 feet long)
3. Vessel at anchor (under 150 feet long).
4. Steam vessel towing another vessel.
5. Fishing vessel.
6. Vessel not under command, but under way.
7. Vessel not under command, and not under way.
8. Vessel in distress.
9. Small steam vessel (under 40 tons).
10. Steam trawler under way.
11. Cable ship not under way.
12. Cable ship under way.



FOR SHIPS' LIGHTS & FLARES

13. Vessel aground.
14. Steam pilot vessel at anchor.
15. Steam pilot vessel under way.
16. Pilot required.
17. Overtaking stern light.
18. Dredger at work (pass either side).
19. Dredger at work (pass on white side only)
20. Lightship on station.
21. Lightship off station.
22. Wreck Lights — Pass on starboard hand.
23. Wreck Lights — Pass on port hand.
24. Wreck Lights — Pass on either side.

correction of chronometers in ships at sea and time signals were transmitted from various high-powered wireless transmission stations for this purpose. It was soon discovered that the direction of the station from the ship could be found by rotating a receiver until the full force of the station was registered, and that by noting the direction of the signal a line could be drawn on the chart to prove that the ship was somewhere on that line of bearing. Fog signals were introduced on this principle, and wireless direction finding of position at sea was thus born.

FIXING POSITION BY WIRELESS

By shutting out other arcs of reception a directional beam was developed, and it was thus possible, by using two stations suitably situated, to obtain cross bearings and thereby fix the position of the ship.

There are two ways in which mariners can obtain a fix by wireless means. Either they can pick up signals from two shore stations, as already described, or they can themselves send out a signal to be picked up by two shore stations which are immediately able to work out the position of the ship and wireless it back. Navigators, however, generally prefer to receive the bearings rather than send them to the chosen stations, as the land stations have more facilities for gauging the accuracy of the signals, which vary in precision by day or by night. They are clearer by night (Fig. 10).

NORTH POLE WIRELESS

As the signals are received over long distances, the shape of the globe must be considered in plotting. This allowance is named convergency, because the meridians converge to the Pole.

If a wireless message were sent from the North Pole, the direction would be south as there is no east and west there. A North Pole wireless station would be situated in an unenviable part of the world from the operator's point of view, but the direction-finding value of the station would be as useful in navigation as the Pole star, and its future installation is probable.

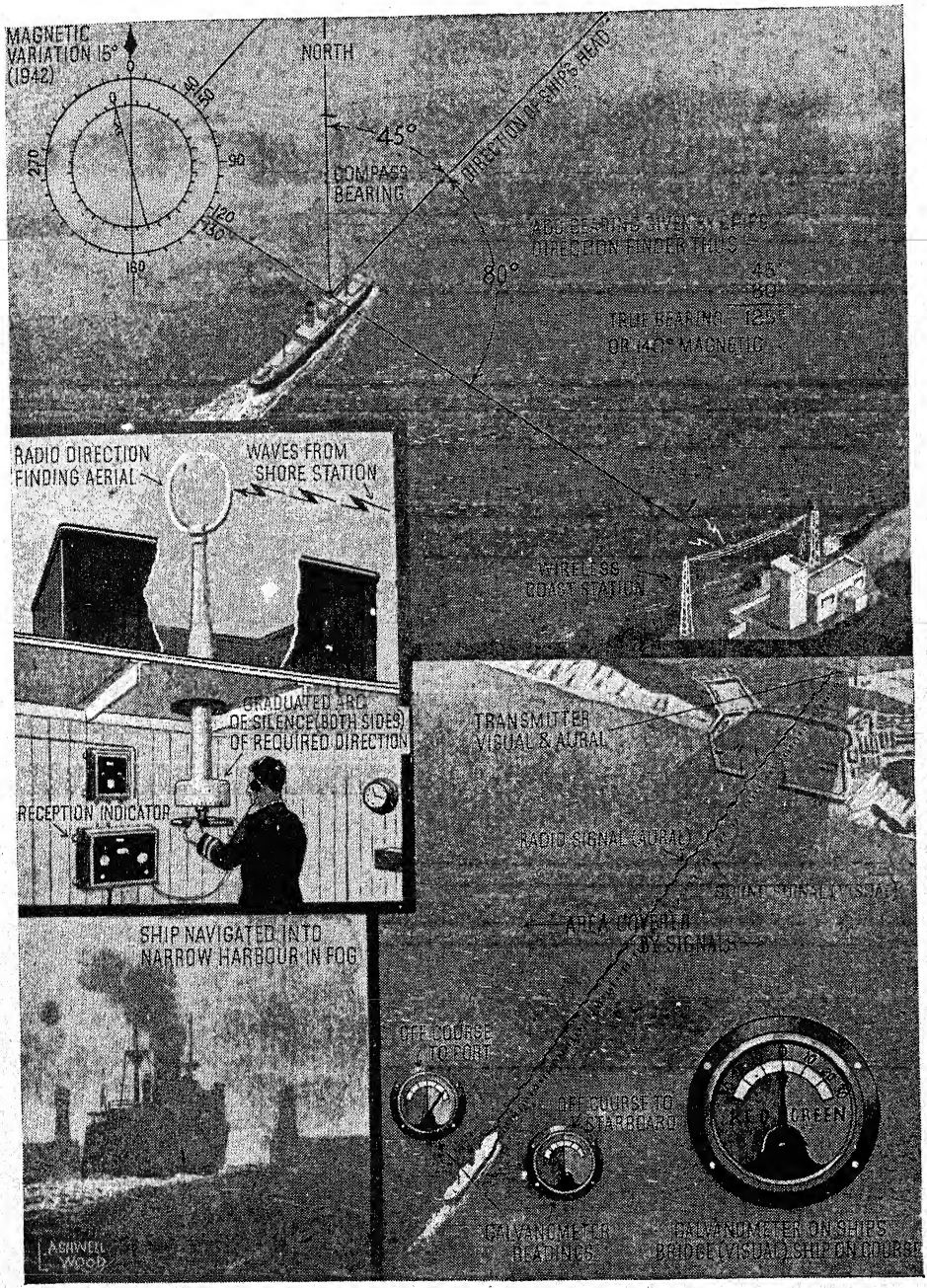
While at sea, ships arrange the hour of arrival in port for the purpose of docking. Large seaports, like London and Liverpool, have dock systems capable of holding many ships, and great quays, with cranes, warehouses, and all facilities for receiving and dispatching cargo.

Docking at low tide means a loss of water in the dock, as the lock must be run down to tide level. Ports, therefore, prefer that ships should enter dock at high tide. To estimate the rise and fall of tide at any place, standard tidal ports are enumerated in tide tables published by the Admiralty in Britain and the U.S. Hydrographic Bureau in the United States. To these standard ports corrections for various places are supplied.

IMPORTANCE OF TIDES

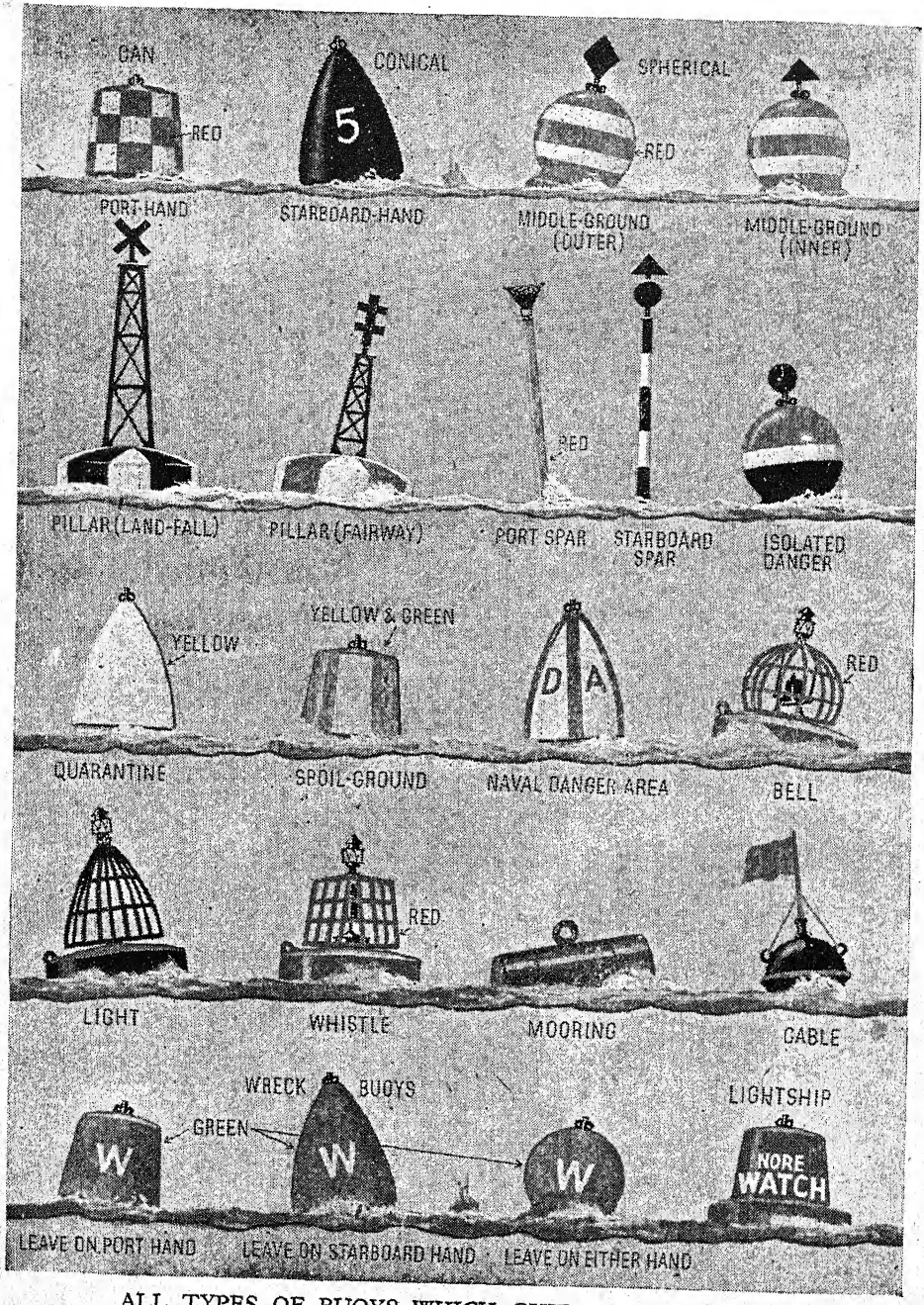
These are called tidal constants. If the seaman has no tables for tides, he finds by the chart the time of high water at full moon and new moon. To this he adds about forty-five minutes for every twenty-four hours elapsed since these times, which will give him the approximate time of high tide on any day. In the Mediterranean, there is hardly any rise and fall. In the Bristol Channel the rise and fall may exceed 40 feet. At Liverpool it may exceed 30 feet, at London it may exceed 20 feet. Southampton has double tides, i.e., four high levels in each 24 hours. This is due to the flood and ebb of the Channel tide visiting the estuary. Portsmouth, which has a narrow entrance to its harbour (close to Southampton), shuts out the second high water.

Soundings shown in depths on charts are reduced to the common denominator of Low Water Spring Tides. Thus the least favourable conditions for



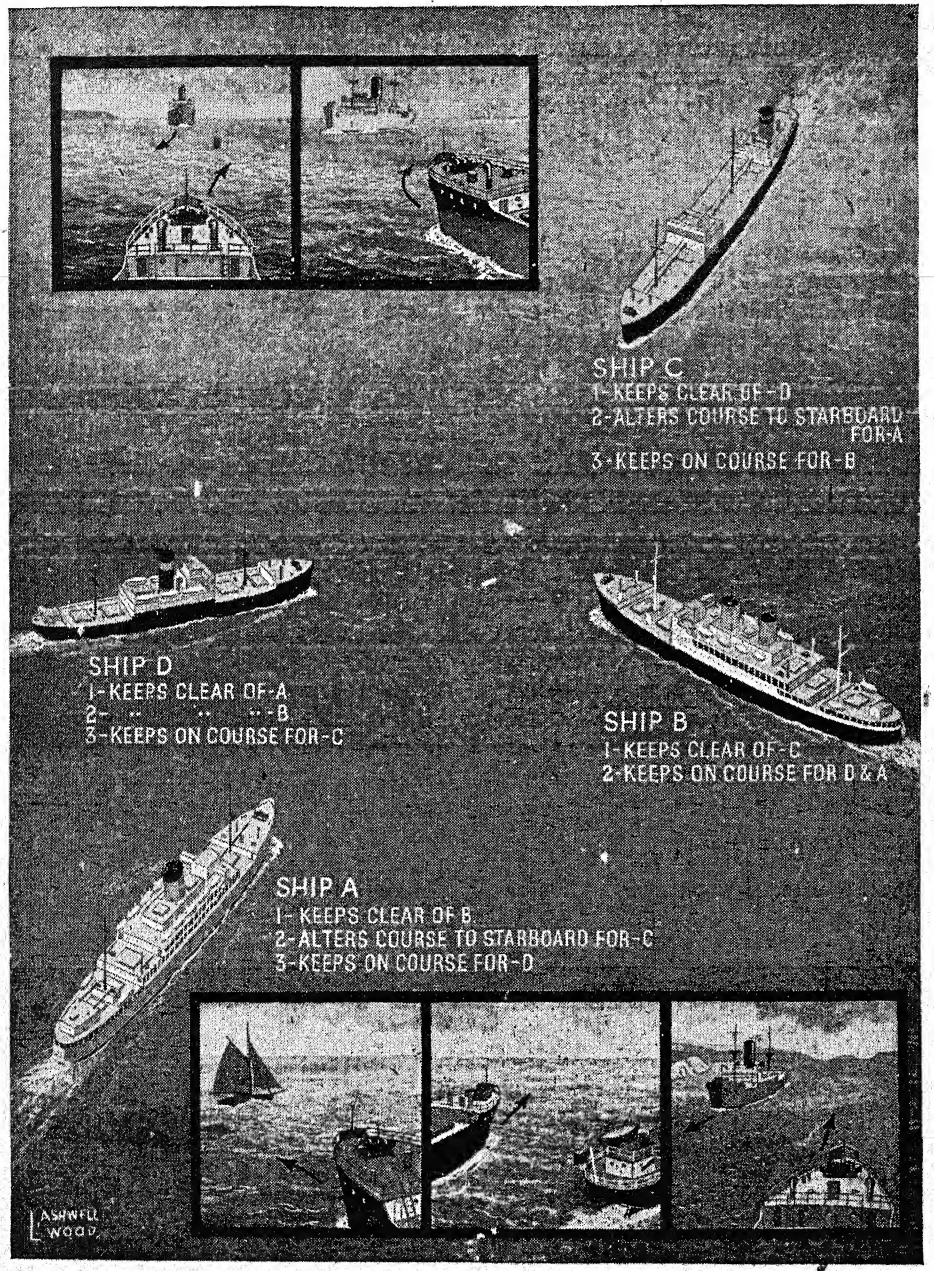
RADIO DIRECTION FINDING AND HARBOUR BEACON SIGNALLING

Fig. 10. *By radio direction finding, ships determine exact position by transmissions from known shore stations (top and centre). Harbour beacon signalling permits ships to safely negotiate even the narrowest harbour entrances in fog by aural and visual course indicators (bottom)*



ALL TYPES OF BUOYS WHICH GUIDE THE MARINER

Buoys are used to mark channels, sandbanks, wrecks, shoals and all danger spots. Their positions are marked on charts. Most buoys round our coasts are in charge of Trinity House. International agreement determines buoyage and fixes a standard system to mark wrecks



RULES OF THE ROAD FOR SHIPS BY DAY

The following principal regulations are illustrated in this composite picture: (1) Two vessels meeting end on, each alters course to starboard; (2) crossing—vessel with the other on her starboard bow keeps clear; (3) power-driven vessels keep clear of sailing craft; (4) vessels overtaking keep clear of the vessel overtaken; (5) vessels keep to the right of the fairway

entering, or lying in harbour, is made clear for the navigator on the chart. Buoys are noted when entering from seaward.

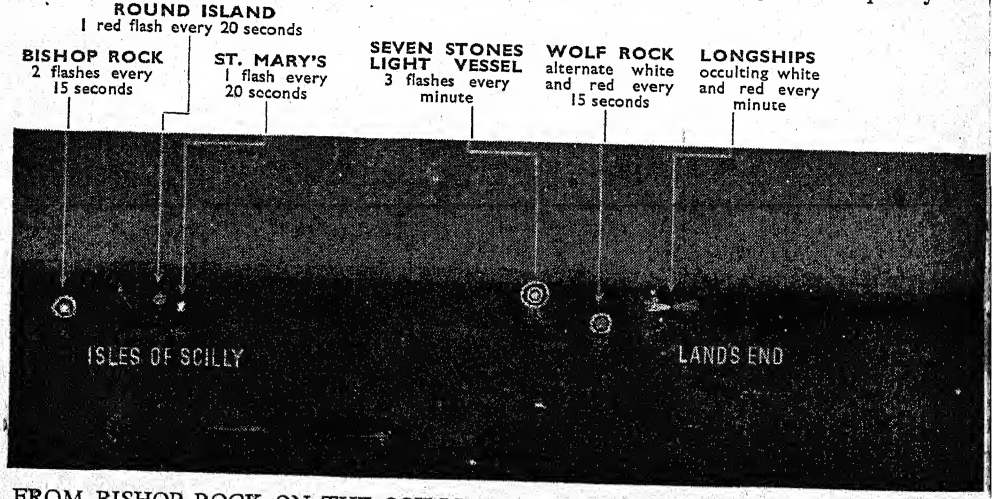
Long before the days of the motor car, which necessitated rules of conduct on the highway, seamen and legislators combined to draw up regulations for preventing collisions at sea, containing safeguards as to manœuvre, and also laying down the colour ranges and design of ships' navigation lights. The starboard side of a ship carries a green light and the port side a red light. On a steamer, or motor-propelled vessel, a masthead, or steaming, light is also carried. On a dark night with a clear atmosphere side lights have a range of about two miles. Masthead lights are visible for five miles.

The rule for navigation of the narrow seas is to keep to the right, that is to the starboard side of a channel. When two ships cross, the vessel having the other on the right, or starboard hand, must give way to the other by easing, stopping, or altering course. When overtaking another vessel the onus lies on the vessel overtaking to keep clear of the overtaken one. Steamers keep clear of sailing vessels, fishing vessels, and any vessels not mechanically propelled. In fog and thick weather, sound signals are used by ships to indicate their course and speed.

There is no international system of lighthouse operation, or any arrangement respecting lightships.

In 1936, international agreement was reached on questions of buoyage and on a standard system of marking wrecks by buoys. Great Britain signed this agreement conditionally on other countries bordering the North Sea and English Channel doing the same. Systems which are preferred in other maritime countries were admitted—thus the Cardinal system may be used where the authorities notify their wish to adopt it. In this system the points of the compass govern the laying of the buoyage. Great Britain uses the lateral system (pages 160-161).

The lie of the banks and other dangers is marked parallel to the routes or channels used. Both systems agree that when entering from seaward the colour of a buoy on the starboard side of the channel must be red, and black on the port side. Shapes by day and frequency



FROM BISHOP ROCK ON THE SCILLY ISLES TO PLYMOUTH BREAKWATER, *Coming up Channel from the Scilly Isles to Plymouth, these lights would be noted by ships. Flashing means showing an instantaneous light between periods of darkness. Continuous lights*

of lights at night help to eliminate confusion. Pilots have to pass rigorous examinations in the positions, courses, and distances of all buoyage.

Before reaching harbour a ship may be in communication with the harbour authority for a long time. The range of wireless telegraph has made this possible.

It is interesting to list briefly the various aids to navigation:—

(1) Direction, or position, finding by ship or shore station: wireless telegraphy.

(2) Fog signals (sound and radio): wireless telegraphy and telephony.

(3) Navigation warnings (ice prevalence, derelicts, etc.): wireless telegraphy.

(4) Time signals: wireless telegraphy.

(5) Meteorological signals: weather reports, gale warnings, synoptic data, etc.

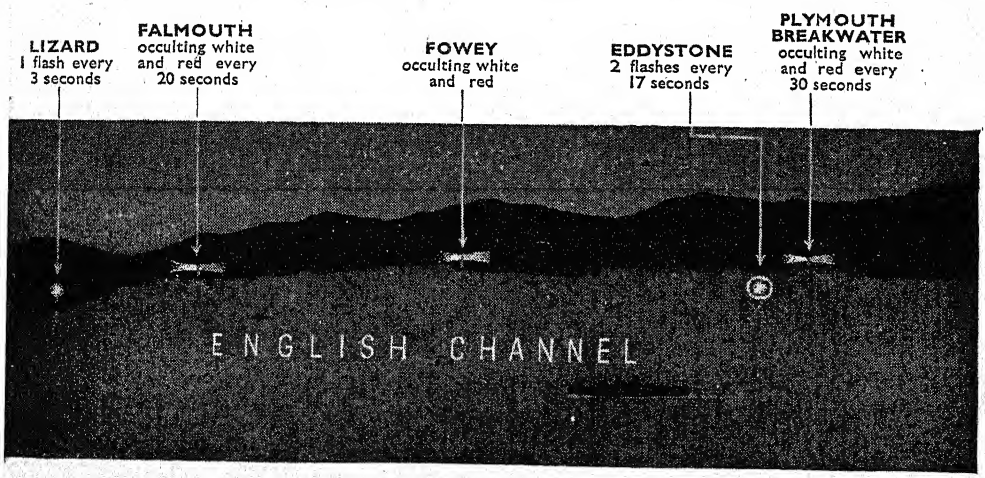
(6) Lighthouse and lightship: communication, ships passing homeward and outward bound, and Lloyd's signal stations.

(7) Submarine sound signals emitted from lightships or shore stations.

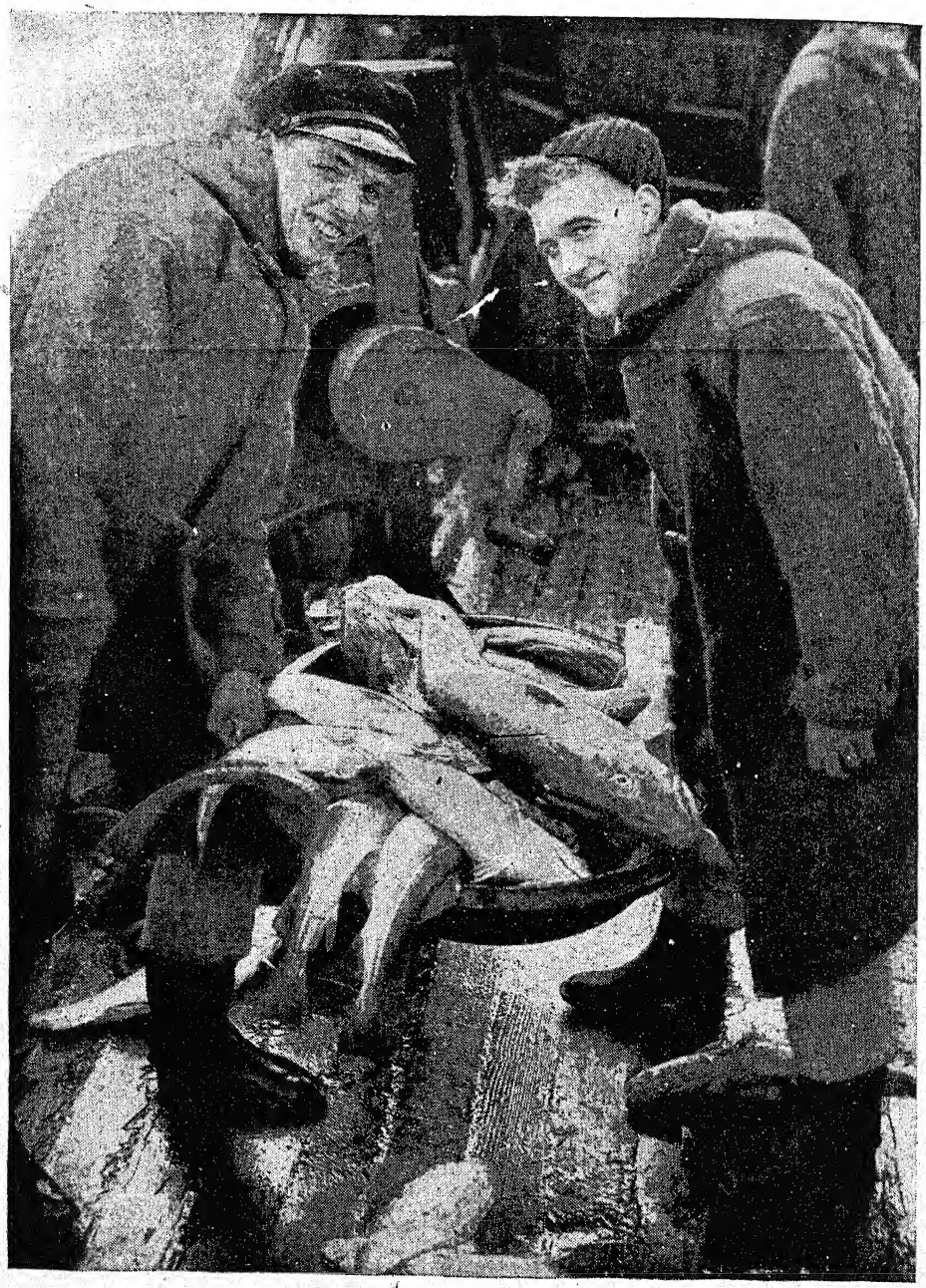
Limited for space, charts can give only essential details, but the most extensive information is available for navigators in the sailing directions published by the British Admiralty, which detail all essential items of marine information.

For instance, there is the *North Sea Pilot*, Part III, comprising the east coast of England from Berwick to North Foreland, including the Rivers Thames and Medway. This volume contains the coastal meteorology: tidal streams and their probable velocity—period of slack water at the turn of the tide; life-saving stations; lighthouses; lightships, buoyage fixing fleets and where one may expect to encounter them during navigation; frequency of gales and fogs; temperature data; wireless stations for the use of navigation, where pilots may be found and tugs engaged; situation of Lloyd's signal stations and the coast guards; port facilities; storm signals.

The movements of ships covered by insurance, and the risks and premiums for sea risks vary with the venture and also depend on where the ship is going, what she is carrying, and the state of hull, wind and weather. England leads the world in this open market of insurance with Lloyd's of London.



CHANNEL LIGHTS IN WHITE AND RED FLASH WARNINGS TO MARINERS
with a sudden eclipse are called occulting lights. In alternating lights, different colours alternate at fixed intervals. Lighthouses, lightships and wireless are the chief aids to navigation



A CHANGE IN THE MENU

This picture of two happy fishermen was taken on a mine-sweeping trawler. They are taking a good haul of freshly caught fish to the cook's galley. When duties permit, members of a mine-sweeper's crew put their nets over to provide a welcome change from the usual menu

CHAPTER 9

Life on Board a Tramp

Destination of cargo. Work in port. Getting in stores. Ready for sea. Full ahead! The day's work. Keeping the watches. Jobs for the bo'sun. Improvements in the forecastle. Care of the cargo. Responsibilities of the master. The human element. Short sea routes. Homeward bound!

A SHIP becomes a "tramp" when operated under an agreement called a charter party. The owner places the ship at the disposal of a charterer, who undertakes to provide a full and complete cargo; the ship contracts to carry it from a port, or ports, in a given area, to a destination either agreed at once or to be determined later within the terms of the charter party. The reason for this is that the cargo on shipment need not necessarily be sold to an importer. It may be, and often is, offered for sale whilst on passage in the ship.

For example, a homeward-bound cargo of grain may be marketed whilst on passage and be bought by an importer, say, in Belfast, who may resell it to an importer in Rotterdam, who may later dispose of it to someone in London, Leith, Cardiff, or, in fact, any port which the ship can enter safely within the limits of the charter party.

But the final destination must be settled by the time the ship reaches the point where it is agreed final orders shall be given. This is usually one of the Atlantic islands, Gibraltar, or, in special circumstances, Falmouth, or when the ship reaches a given position, by wireless. This question of destiny of the cargo is the fundamental difference between the liner and the tramp. In the case of the liner, the voyage is predetermined precisely. With the tramp the scope of each stage of the voyage is more broadly defined.

Not until the sea pilot climbs down the rope ladder to his launch or cutter does the tramp ship enjoy that sense of independence which characterizes all her journeys and is a feature of her life.

The period spent in the home port, though having its compensations with a few days leave, is on the whole irksome in comparison with regular routine at sea.

OFFICIAL VISITORS

There are "intruders": the Customs officials, the stevedores, the health authorities, the Factory Act inspector, the Board of Trade inspectors and, of course, the company's marine superintendent. All have questions to ask, investigations to make, visits here, there and everywhere, all over the ship. Although their object is to do everything possible to secure safety at sea and to ensure efficiency in all departments, their visits are bothersome.

The owner's visit, on the other hand, is welcome. It is satisfying to point to the work done last voyage, to be able personally to explain difficulties and suggest improvements, and also it is heartening to hear his words of appreciation and encouragement. But apart from official visitors there are others whose presence is a great joy. Those officers and engineers who cannot go on leave are joined by their wives on board, and though work constantly intervenes it is the next best thing to going home. Good-hearted women, these sailors' wives who, in order

to spend a few days with their menfolk, put up with the noise and confusion of a ship working cargo.

Although some vessels load general cargo, a tramp ship's outward cargo from the United Kingdom is usually coal. Formerly we sold to foreign customers upwards of 70,000,000 tons a year.

The crew from the last voyage have been paid off and the ship is being worked with the help of "riggers," or "lumpers," old sea-dogs, mainly, who now work ashore in a sort of semi-retirement from the sea. The signing-off of the officers and engineers is in effect a formality, because they immediately sign on again, unless they are leaving the ship. The signing of the remainder of the crew is usually deferred until a day or so before sailing.

The chief officer watches the loading. Hatches and beams have been removed and derricks hoisted. The ship is moored alongside the coal-tips, and so the operation of tipping coal over coal-hoists into the ship's holds begins, accompanied by the rumble of coal and clouds of coal dust.

Usually at the moment when the ship is at its very dirtiest, the stores arrive.

CHOOSING THE CREW

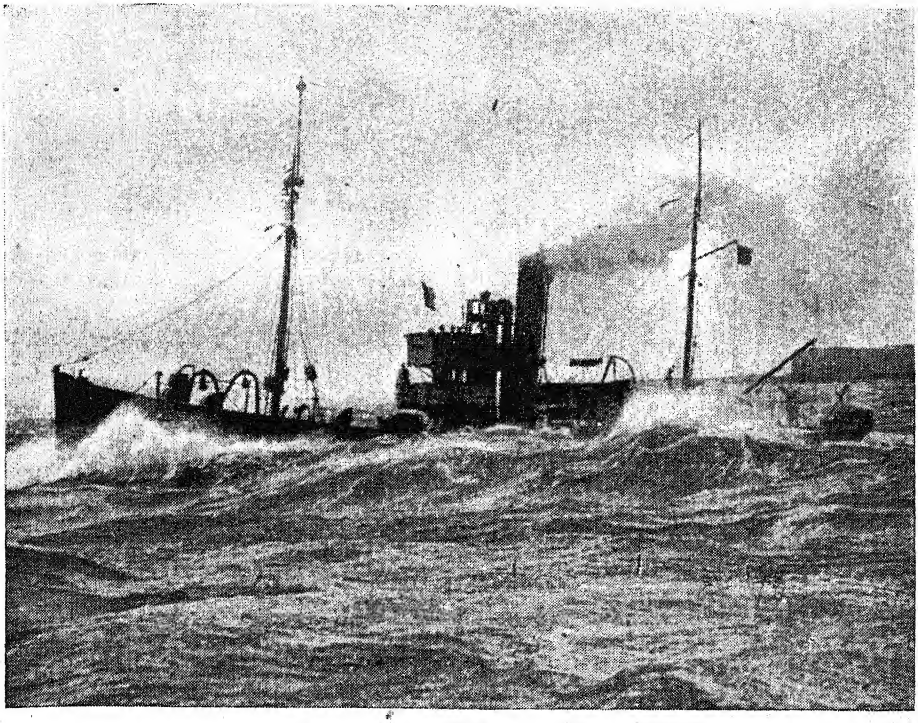
Barrels of oil, ropes, wires, paints, and a hundred and one things for the deck and engine departments; cases of meat, tins of ship's biscuits, flour, tea, sugar, jams, in fact a complete grocer's shop, for the steward's reception. Later come the fresh meat and fish, together with ice for the ice box, unless a refrigerator is installed. Stores are stowed away, and in spite of the coal dust and the impediments of staging for trimming the cargo, everything finds its way to its appointed place. A hail from the shore announces that the waterman is ready to connect up, and the hosepipe is run aboard and the freshwater tanks are filled to their capacity. And now, with the loading of cargo nearing completion, the master announces the day and time for signing on the remainder of the crew. The chief officer selects his men and the second engineer selects his, and, following the usual procedure at the shipping office, the whole ship's company, including the wireless officer, has signed on articles. The master has selected the charts he requires for the voyage, and these have been delivered to the second officer in charge they become.

LAST DAYS BEFORE SAILING

By now the ship is almost down to her Plimsoll marks, and the chief officer is carefully watching trim and regulating the shipment of the last wagons of coal accordingly. Satisfied that enough is aboard, the cry goes out: "Up Chute," and coal teeming is over. The trimmers work on till all the coal is below deck and safely stowed. Staging is taken ashore, and preparations for sea follow. Beams and hatches and tarpaulins are put on, derricks stowed and secured.

But what of the engineers? Has the period in port been in the nature of a holiday for them? Not exactly a holiday, except that there is no watch keeping. Engine overhauls of a minor nature have been effected, and steam for working winches has been maintained on the donkey boiler. The main boilers have been opened up and scaled by shore labour, afterwards boxed up and filled with fresh water. Simultaneously with the completion of loading, steam is raised on the main boilers, and the engines are warmed through. In motor ships, whilst there is, of course, no steam to raise, the engineers have plenty of alternative work, such as adjustments, internal cleaning, and many other essential jobs.

By now the master has signed bills of lading for the cargo. He has cleared at the Consulate of his destination and at the dock office. The agent has ordered the dock pilot, tugs, and boatmen, and the ship



LEADING THE CONVOY

Ahead of a convoy, forging her way through heavy seas off the coast, a minesweeper carries on with her work of clearing the channel of mines for the safe passage of the merchant ships

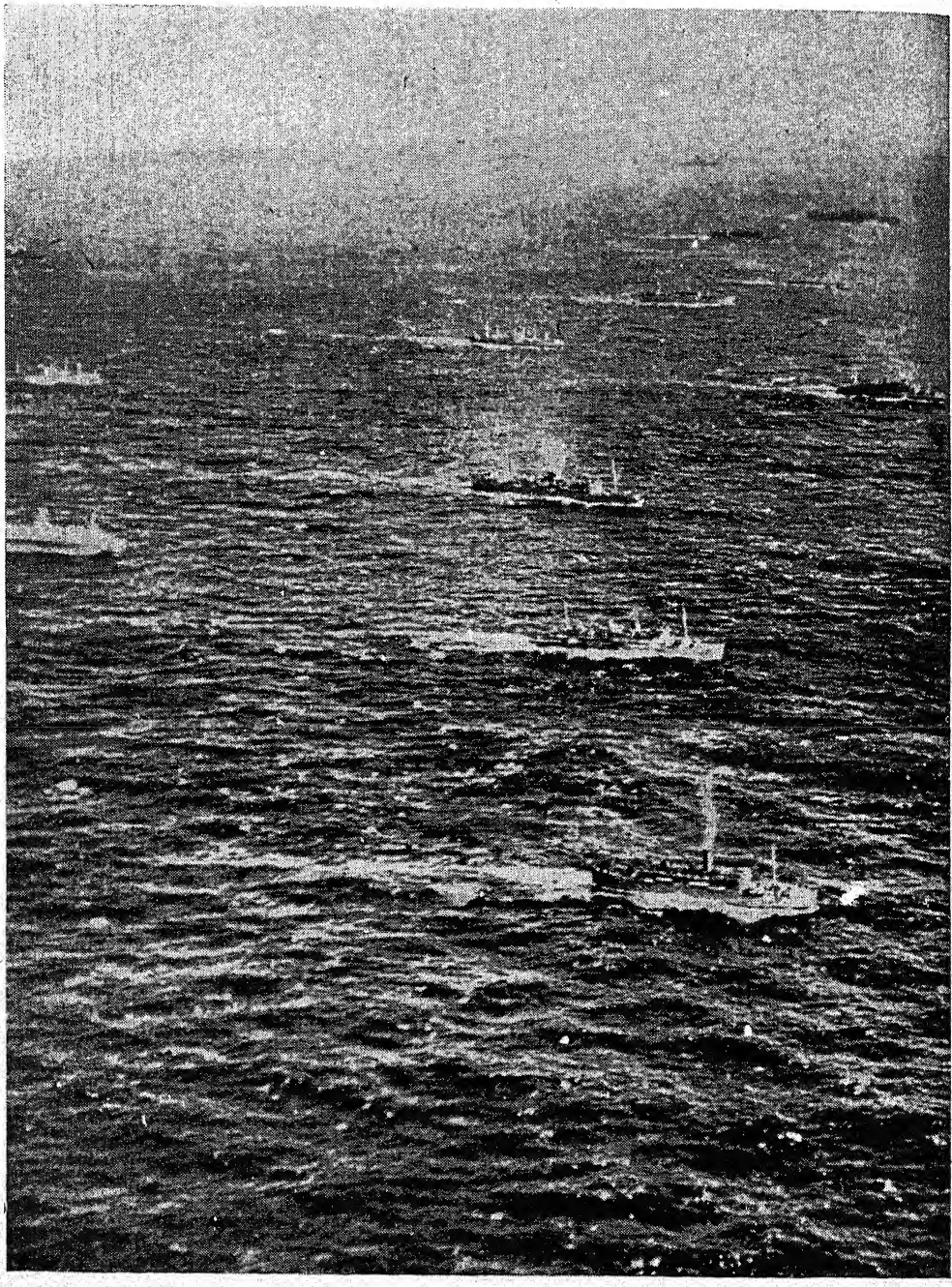
heads for the lock gates. Here the channel, or sea pilot, boards her, and slowly the ship makes her way down the buoyed channel into deep water, where the pilot cutter is waiting to receive on board outward channel pilots and to place other pilots on board inward-bound ships.

And so, with expressions of good wishes for a pleasant voyage, the pilot says goodbye. The ship heaves gently to the ground swell, the steam safety valves call the ship's impatience to be on her way to her allotted destination.

Half ahead ! Full ahead ! The safety-valves close and there is a marked quiet. Only the gentle beat of the engines can be heard, the cries of the seagulls, and maybe the swishing of the hosepipes as the crew wash down on deck. At sea again! Here, then, is the call of the sea at its strongest—the open expanse of ocean, the forthcoming battle with the elements, the spirit of adventure, and the crew's realization of dependence on the ship and on themselves. The helmsman repeats aloud the course set by the master, deftly he spins the wheel, bringing the ship's head on to her appointed course. The log is streamed, and the second officer is busy in the chart room, laying out the requisite charts, sailing instructions, and so forth, which are necessary for the voyage.

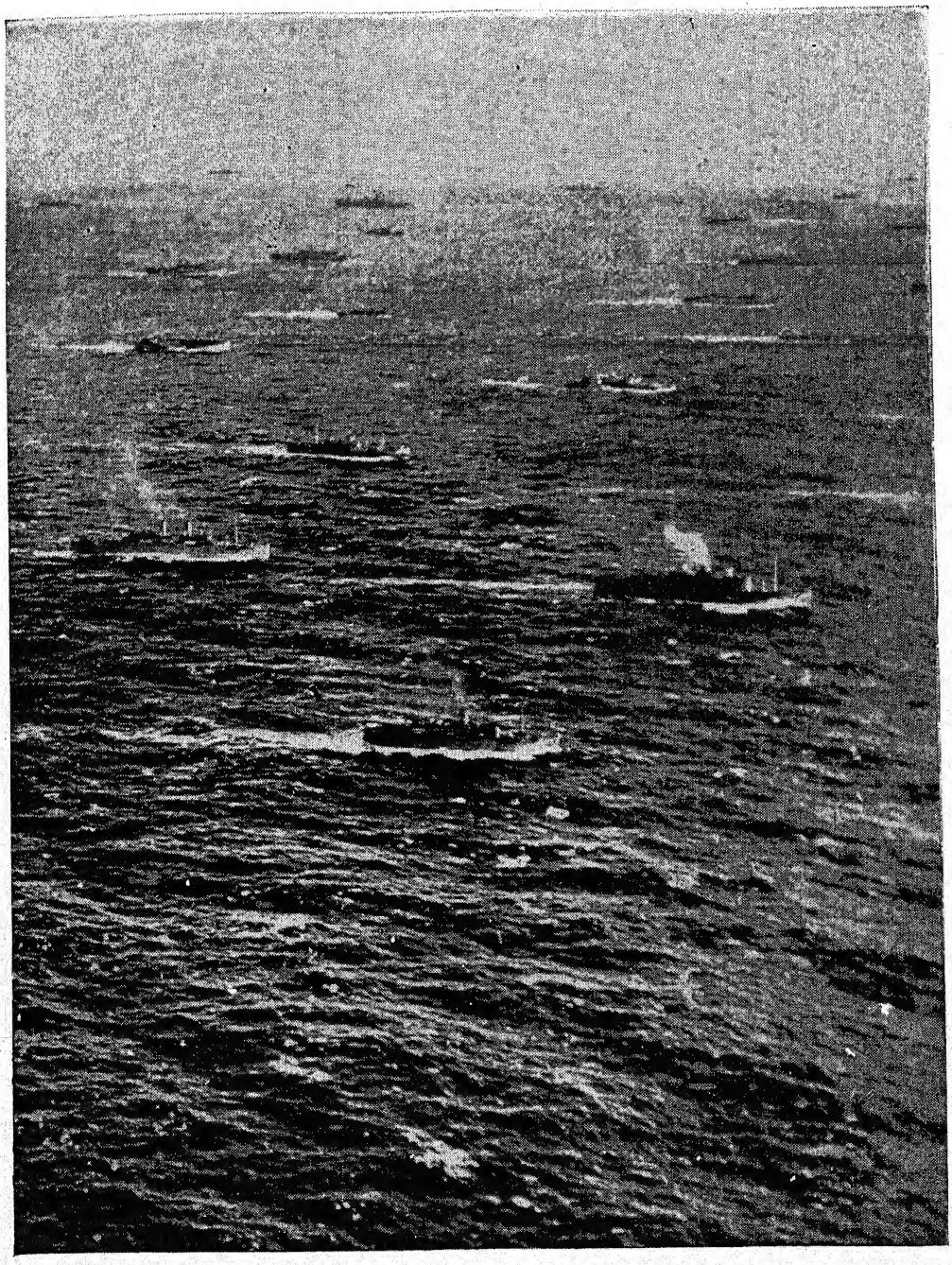
But whither bound? Let us suppose that the coal cargo is destined for St. Vincent, Cape Verde Islands, which would be about a fortnight's voyage. But after St. Vincent, what then?

Perhaps it may be the Gulf of Mexico, for sulphur, grain or cotton; Cuba for sugar; the River Plate for grain, or South



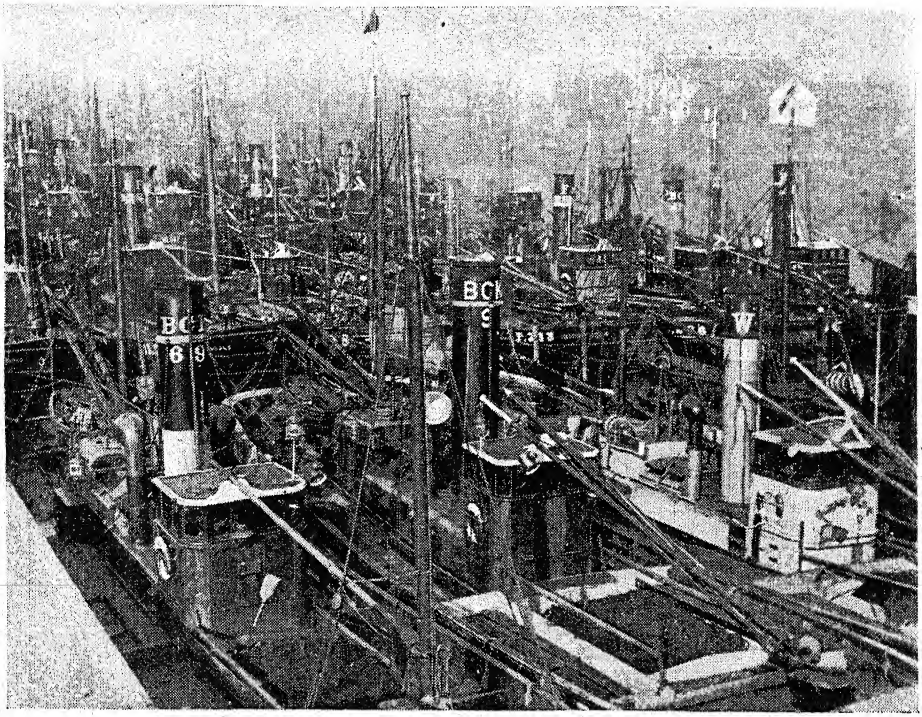
LARGEST CONVOY IN HISTORY CARRIES BRITISH AND

In this remarkable picture, taken from one of the aircraft of R.A.F. Coastal Command, ships of the Navy and the Merchant Navy seem to cover the sea as far as the horizon. They formed only one part of the mighty armada—some 500 transports, with 350 escorting naval vessels—bound



AMERICAN FORCES TO LAND ON THE NORTH AFRICAN COAST

for the coast of French North Africa. They made successful landings of British and U.S. troops at many places on the Mediterranean and Atlantic shores. Aircraft of R.A.F. and U.S. Army Air Forces maintained a great protecting air "umbrella" over the vast convoy



FISHING FLEET IN HARBOUR

In harbour at Yarmouth, this crowded assembly of little ships of the Scotch fishing fleet gives a forest-like effect of masts and funnels. The drifters follow the shoals of herring down the North Sea. Scottish girls clean and pack the fish as soon as it is unloaded

Africa for maize. And then? Home, maybe, but always with the possibility of a destination farther afield. But wherever it is, the ship must remain self-sufficient, and a separate and complete entity.

So the ship's company settles down to sea routine: watch keeping for some, maintenance work for others; the firemen in the stokehold, the steward and his cook and boys attending to the commissariat. On the bridge, the chief officer takes the watch, both a.m. and p.m., from four to eight: the second officer takes the middle watch, which is twelve to four, and the third officer the eight to twelve watch, usually under the master's supervision.

The sailors take their turn at the wheel and the look-out. Below deck the firemen form into watches of four hours on and eight hours off. In the engine room the second engineer keeps the four to eight watch, the third engineer the middle watch, and the fourth engineer the eight to twelve watch, the chief engineer keeping him under his supervision.

From now on, until the arrival at the first port of call, the watches function with a smoothness born of habit. But, apart from watch keeping, there is much to do.

The bo'sun takes charge of the spare men of the watch and the deck boys, and sets about the work of maintenance. Derrick wires, topping lifts, and running gear are taken down, cleaned, greased and stowed away. Mooring ropes on the forecastle and poop are stowed below, and mooring wires either wound on their wheels or stowed in a dry and safe place.

In the storerooms and lockers, care is taken that everything is so stowed and lashed that it will not be deranged by the movements of the ship. The bo'sun finds time to look over the lamp locker and assembles the paints and sailing gear in readiness for use as soon as the work of putting everything shipshape is complete. In a steel ship, rust is the perpetual enemy, defeated only by constant scaling and painting.

Meantime, the ship's carpenter (familiarly known as Chippy), has oiled and greased the steering gear and sounded round—it is his daily practice—all tanks and bilges, recording his readings on a board at the top of the engine room, so that the engineer can see if any particular part of the ship requires pumping. He also sounds the freshwater tanks and keeps a record of how much water is being used. He greases the winches to prevent working parts becoming seized up, and then turns his attention to such work as repairing hatches, lockers and doors, overhauling blocks and tackles, and the hundred and one other jobs which come within the scope of his trade.

The chief officer is responsible, under the master, for the maintenance and up-keep of the ship, and the bo'sun and Chippy are his right-hand men. To achieve success, apart from being hard working and skilful in their trade, they must be opportunists. For example, when the ship's holds are full of cargo, maintenance work is concentrated on deck, but when the ship is sailing in ballast attention is directed to maintenance of the holds and 'tween decks. In addition, the chief officer must keep his weather eye open and choose

JOURNEY'S END—SHIPWRECKED SEAMEN COME ASHORE

Stepping ashore at a Scottish port, these men remember a hard and eventful voyage. Their ship was torpedoed in the Atlantic and they endured fifteen grim days in lifeboats before being rescued. Survivors of sunk ships met the hardships they suffered with great courage

his day and place for putting the sailors to scaling and painting, so that their efforts may not be spoilt by rain and sea water.

In the engine room department there is plenty to do, in addition to the usual duties concerned with watch keeping. The relationship of the donkeyman to the fireman is equivalent to that of the bo'sun to the sailor. In sailing-ship days, when a boiler was sometimes carried to supply steam to operate the winches for loading and discharging cargo, this boiler came to be known as the donkey boiler, presumably because it did the donkey work. The man in charge was called the donkeyman, and this name is still applied to one who is, in fact, the leading fireman.

Most tramp ships and some motor ships carry a donkey boiler, and at sea it is the donkeyman's duty to clean and scale this boiler in readiness for use when the winches are next being worked. In addition, the donkeyman assists the second engineer on his watch, and is generally looked upon as the handyman of the engine room. Although uncertificated, the donkeyman becomes a skilled worker by long experience, and is of immense value on the engine room staff. In addition to watch keeping, the engineers themselves take the opportunity, when the ship is at sea, to overhaul winches and other auxiliaries which are used in port.

FIXING THE SHIP'S POSITION

At about eight o'clock in the morning and again just before noon, the master, together with his deck officers, stand by with chronometer and sextants to take sights and establish the ship's position. Eight a.m. is the time to find the latitude, and noon the longitude.

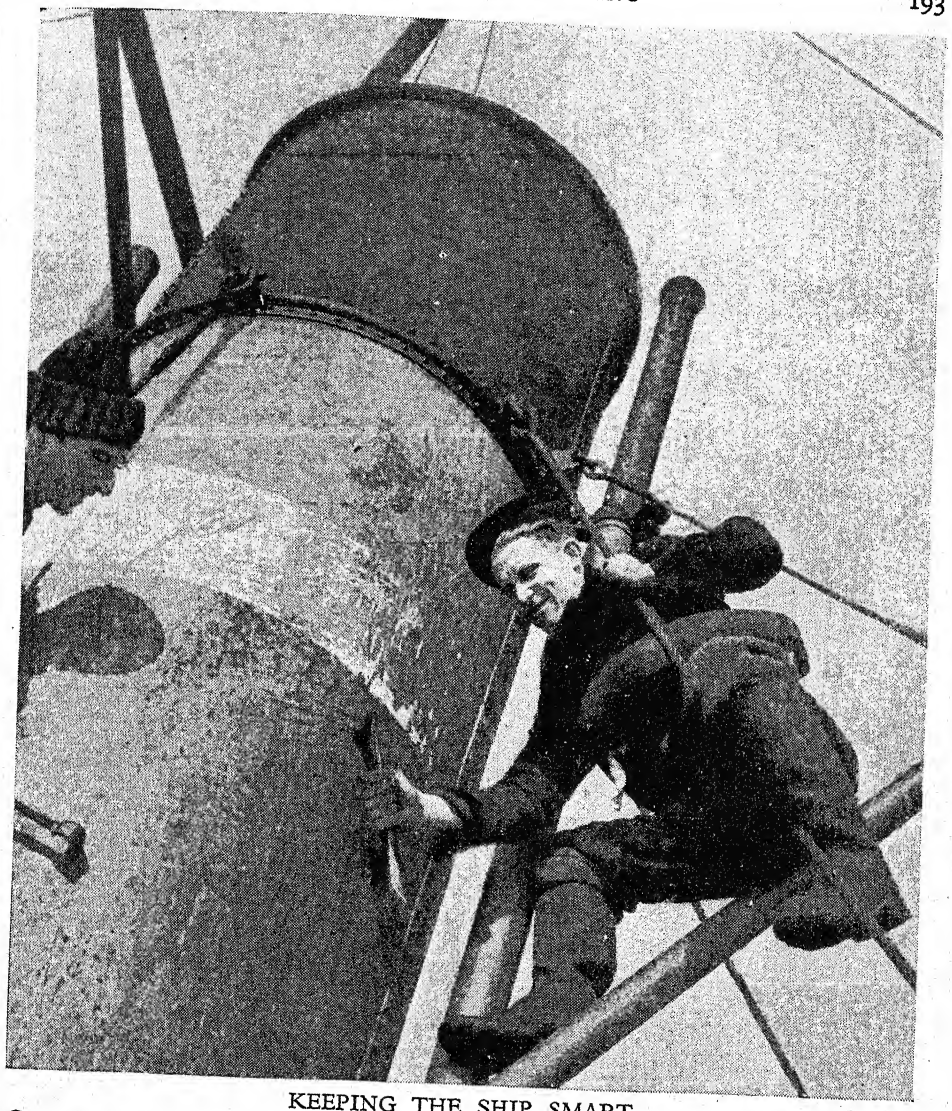
It is customary for all the officers to take their own sights, not only as a cross check on the master's observations but as experience for all. The modern ship, however, is still further assisted in the problems of navigation by electrical depth-sounding machines and wireless direction finders. The tendency of the future will doubtless be for radiolocation and other recent discoveries to be used for sea navigation.

But men must eat, and in the galley, as the kitchen is called, the cook, unperturbed by the heaving of the ship, is to be found preparing substantial and wholesome meals for an ever-hungry ship's company. Hard work and sea air ensure hearty appetites. It is not unusual for the master, chief engineer, and other first officers to dine together, as this arrangement gives them an opportunity of discussing the working of the ship and is conducive to full co-operation between the various departments. The other officers and engineers have their own messroom, and the sailors and firemen have separate messrooms adjacent to their quarters.

FORECASTLE ARRANGEMENTS

For years past it has been the custom to accommodate the deck officers in bridge housing, and the engineers in rooms built above and in way of the engine room. In these circumstances the crew's quarters were placed in the poop between decks, which are still called forecastles, although for crews to be housed in the forward end of the ship is an arrangement long discontinued in many ocean-going vessels.

That the crew's accommodation in the after poop is still called the forecastle is, of course, a habit which has come down through the years and dates from sailing-ship days, when the crew always lived forward and the master commanded from the after end. It would, perhaps, be too much to say that it is yet customary for all the ship's company to be housed amidships in a modern tramp vessel, but this arrangement was, in fact, introduced in several tramp ships during recent years. With the introduction of running hot and cold fresh water, central heating and other improvements, the advantage of concentrating accommodation amidships is emphasized.



KEEPING THE SHIP SMART

Constant scaling, chipping, and painting are necessary on a steel ship. The proper maintenance and upkeep of the ship demand unfailing attention, and rust is the perpetual enemy. These two members of the crew are busily engaged in cleaning the vessel's smoke-stack

Certain it is that the days when the men's quarters were always placed below deck are passed, and ships of the future will, without doubt, accommodate their crews in rooms erected above the weather deck. Moreover, the example which has been set in a few modern tramp ships of having a recreation room for the sailors and firemen, with wireless sets and a ship's library, will be followed in future ships.

As the course from Great Britain to St. Vincent, Cape Verdes, includes some westing, the ship's clock is adjusted daily accordingly. Leaving the Bay of Biscay

behind, the ship runs into warmer climes, and with the approach to the first port of discharge, the chief officer turns his attention to the preparation of winches and cargo gear for discharging.

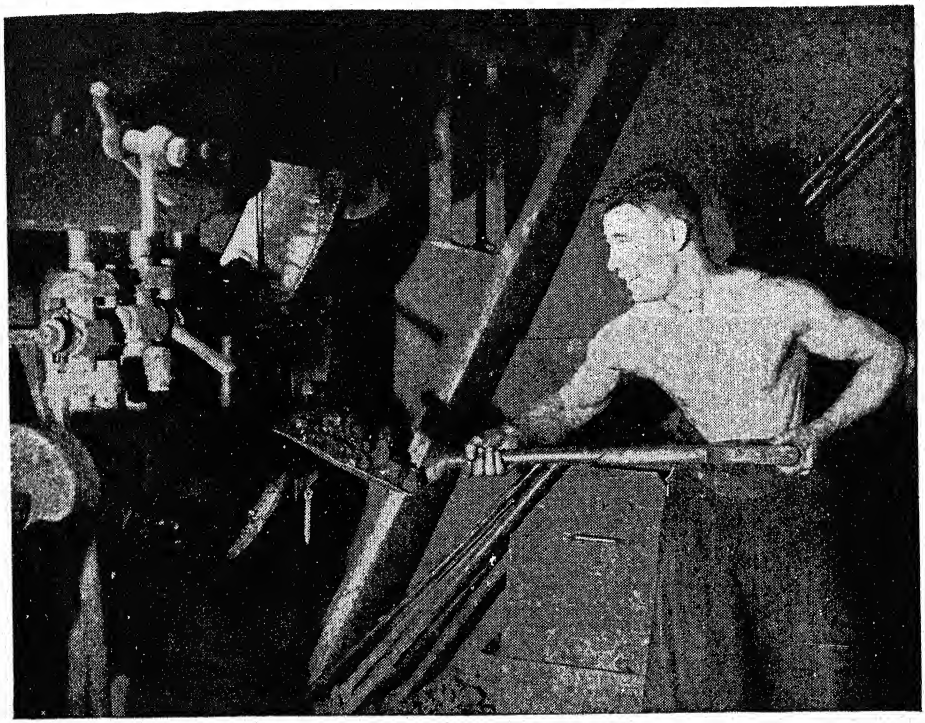
Once within shelter of the land and in smooth water, the derricks are hoisted, tarpaulins removed, and by the time the ship is moored in the harbour and the Customs and business formalities are over, everything is in readiness for the work of discharging to commence.

Coal and similar cargoes are discharged by various means, according to the facilities available in the port. These vary, and may embrace an elaborate system of travelling grabs, or a series of shore cranes operating grabs or tubs. The facilities may be limited to one or two cranes, working in co-operation with the ship's own gear, or there may be no shore facilities at all, in which case the cargo is discharged entirely by the ship's derricks and winches. Whatever may be the system, however, the work is done by labour from the shore, and is not the concern of the ship's crew.

There are, however, some members of the ship's company who have responsibilities, as, for instance, the donkeyman, who has to supply the necessary power for the winches. The ship's officers have to see that the shore appliances used to discharge the cargo do not in any way damage the ship. It is not customary to tally a

RECREATION IN THE FORECASTLE

Draughts and dominoes enliven the off-duty hours of these seamen, and they play with intent care, happily absorbed in the fortunes of the game. Spare moments are few, and too valuable to waste. Modern tramps have a recreation room for the crew, with wireless and a ship's library



KEEPING UP STEAM

Hard at work in the boiler-room of a trawler. Many of the fishermen of Britain still man their stout little craft, hunting now for enemy mines instead of fish, clearing the channels of danger to ensure the safe conveyance of supplies. Many trawlers were equipped as minesweepers

homogeneous cargo, such as coal, but in the case of a general mixed or bagged cargo, where the ship has given a receipt in the form of a Bill of Lading for a certain number of packages, the ship's officers are concerned not only with the intake but with the correct out-turn. To assist in this check shore tallymen are usually employed.

The period spent in port discharging has given the members of the crew opportunities for excursions ashore, but, notwithstanding such attractions, it is true to say that the sailor is usually glad to be away on his voyage again.

The completion of discharge at the final stage of the outward voyage is always accompanied by a definite sense of achievement, and there certainly seems to be a different atmosphere in an outward bound ship from a homeward bound one. It is not a matter of homesickness, because one of the first things to be noticed about a sailor recently arrived home is his anxiety to be at sea again. Outward bound, all on board seem to be concerned with *beginning* jobs of work, whereas homeward bound, everything is being organized and timed for completion and to have everything in shipshape order for the arrival home.

In a tramp ship's life, until a cargo is aboard destined for home, the itinerary of the round voyage is always in doubt. A tramp ship which leaves home with an initial cargo without further engagements must, of course, receive instructions, either by wireless during the first outward passage or during the time of discharge at the

first port of call, as to its next destination. The discharge having been completed and the instructions having been received, the vessel then proceeds, and unless the cargo fixed to be shipped happens to be actually at the port of discharge, the ship goes on her way in a state referred to as in ballast.

Here, again, is a legacy of sailing-ship terminology, dating back to the time when a sailing ship, undertaking a long voyage without cargo, had to take on board solid ballast for stability purposes. The modern tramp ship, however, does not take on board solid ballast, but instead fills the ballast water tanks, formed by the construction of the vessel's double underwater skin. The responsibility for running up ballast tanks and pumping out these tanks rests with the engineers, and the controlling valves and pumping machinery are situated in the engine room.

A voyage in ballast is a voyage with the holds empty, and it will therefore provide the opportunity for scaling and painting the ironwork in the holds and for effecting repairs to tank top ceilings, spar ceilings, and shifting board and limbers. Before receiving a cargo such as sugar in bags, bales of cotton, grain in bulk or in bags, the ship's hold must be scrupulously cleaned, and when the cargo is loaded no bag, package, or parcel which is stainable must be allowed to come into contact with anything which will stain or damage it.

CARE OF HOLDS AND CARGO

It can be seen, therefore, that the work of preparation to receive a fresh cargo is formidable, particularly when it is remembered that the preceding cargo may have been a dirty one, like coal, nitrate, or ore.

The holds, having been washed and brushed down, and thoroughly dried, are often dunnaged. This is done by the use of burlap, or fibre mats. But in stowing a perishable cargo there is the added consideration of ventilation. For certain cargoes the normal ventilation provided in the ship's construction is inadequate, and extra ventilation is effected by leaving gaps or shafts between the cargo.

Precautions, too, must be taken against damage to the cargo by condensation, or sweating, for a ship during a single voyage may experience many changes in climate, so that condensation is inevitable. It is customary for the ship's crew to carry out the cleaning of the holds, the work of dunnaging and provision of extra ventilation being performed by the shore stevedores as and when the cargo is loaded.

During the voyage the chief officer will regulate the ship's ventilators as may be necessary, in order to keep the cargo in good and sound condition.

The landsman, when he takes a voyage on the sea, is inclined to complain that sea life is monotonous. Not for the sailor.

IN CHARGE OF THE SHIP

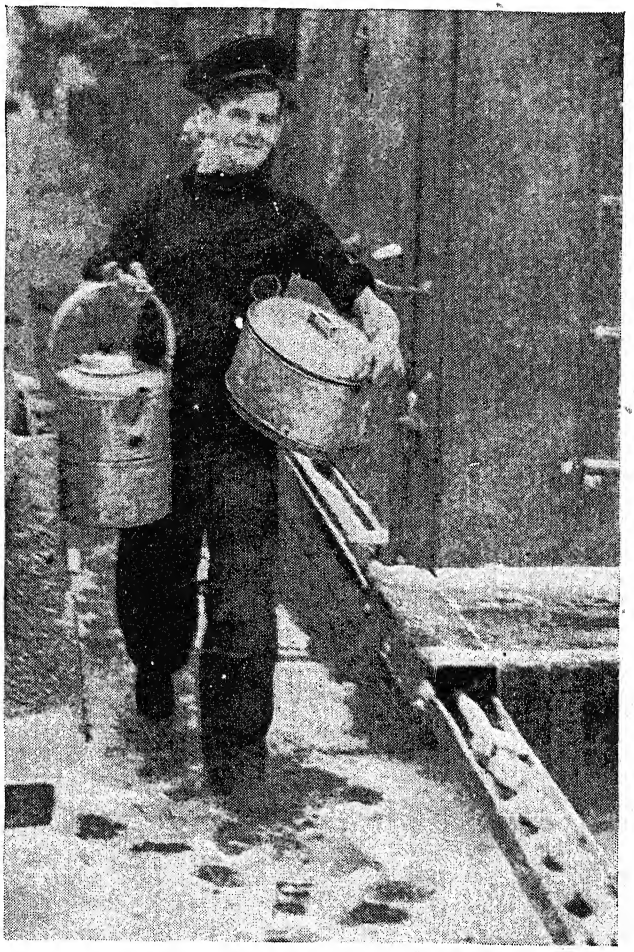
Quite apart from the variety of work to be carried out on board in connection with the maintenance of the ship, the preparation for various types of cargo and its safe carriage through the hazards and perils of the sea, his life is one continual change and full of incident. So successful have been the efforts to reduce sea perils to the minimum that major disasters in peacetime are few, and this happy state of affairs is due to the naval architects and shipbuilders, and perhaps even more to the skill of the sea-going personnel.

The sight of a tramp ship lying in dock may suggest that such a vessel is a lumbering lifeless thing, but to see her in a seaway, heavily laden and skilfully handled, is to realize that a ship is a scientific instrument, seaworthy, adequately buoyant and alive; she must be capable of withstanding heavy stresses and strains, and under the able control of a British master must be able to weather the storms and ward off the heavy and malicious blows of the green seas in a manner which might almost be termed graceful.

But even the most well-designed ship would not come through the ordeal of Atlantic gales and tropical storms without the skilful handling of the master, or, as he is usually referred to on board, the old man. It is at such times that the old man comes to be revered by the rest of the ship's complement.

Most of them have learnt enough of the sea to be able to appreciate that he knows what he is about. He seems to know just when to ease down, alter course a point or two, bring the wind and sea to a less dangerous angle, heave to, if things become worse, but always with a cool and settled confidence which is an inspiration.

It is difficult to find an experienced sailor who is afraid of heavy seas—but a sailor hates fog. In a storm he is master of his own destiny, but in a fog there is the ever-present danger of the unguessed movement of an unknown ship under another shipmaster's control.

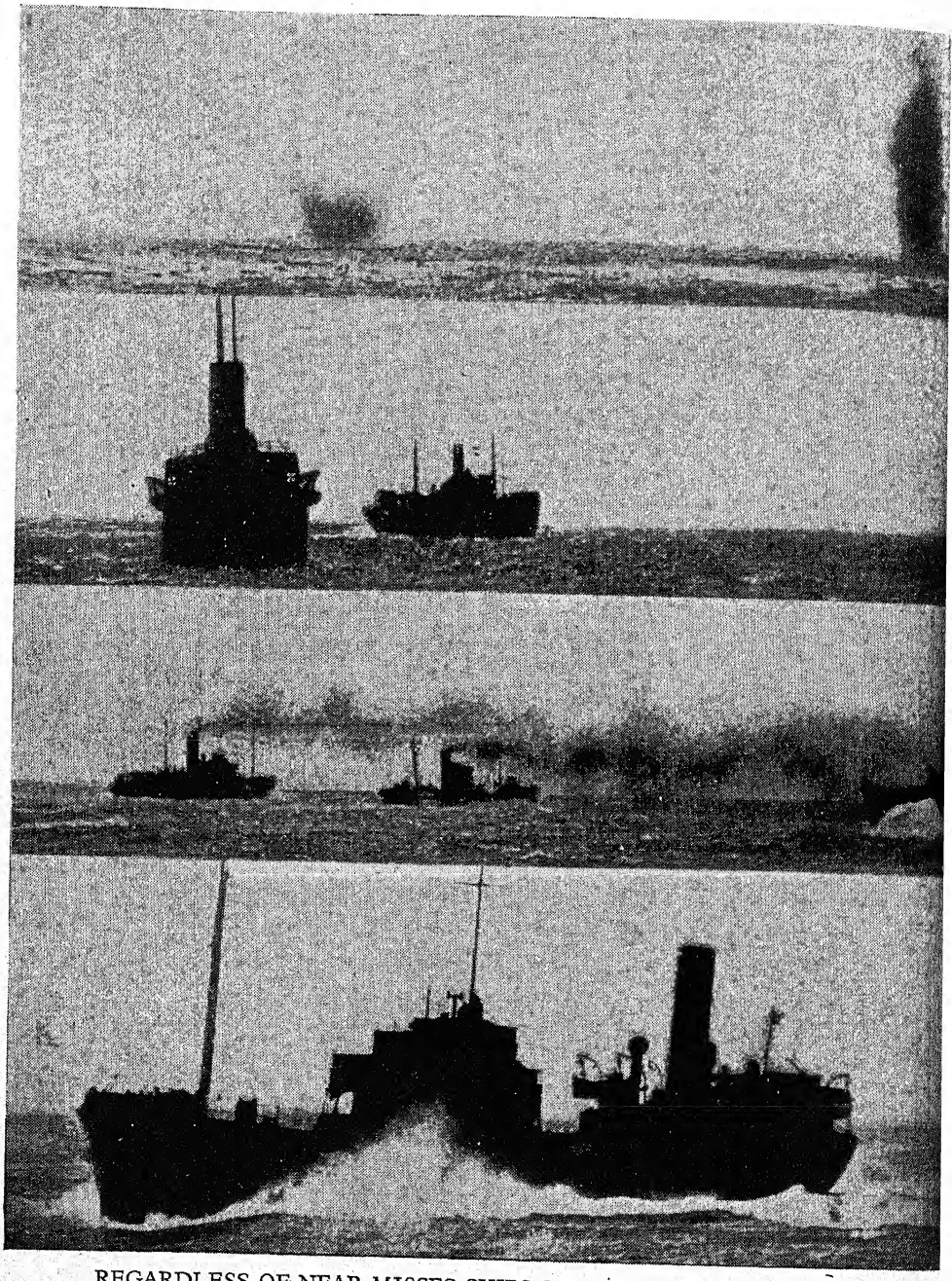


MAKE WAY FOR THE COOK

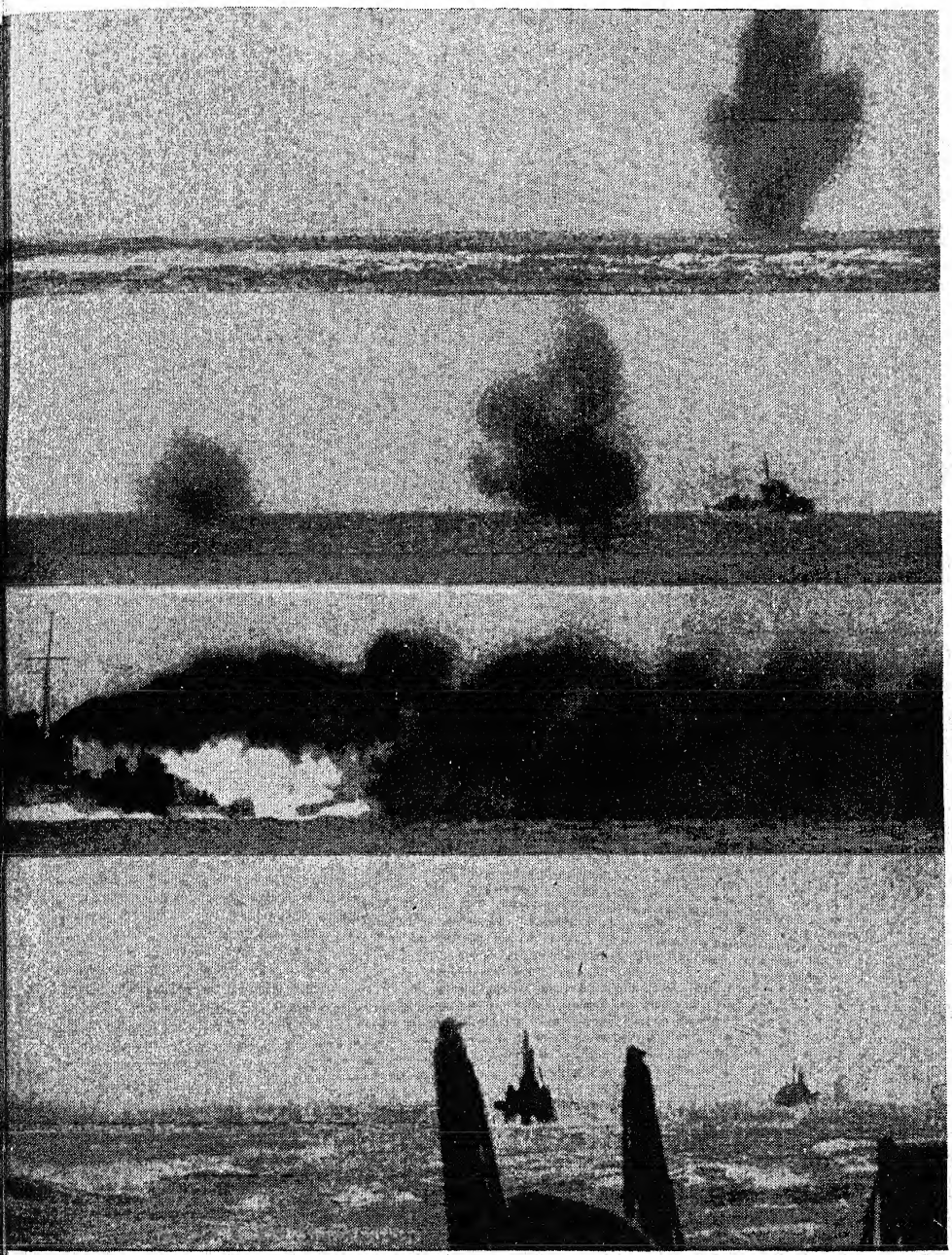
The cook brings back the dinner-tins from the mess deck. They are very light to carry, for seamen's appetites are hearty

The outward and any intermediate voyages having been accomplished, the ship arrives at the homeward loading port. The idea of being homeward bound has its own sentimental attractions, but apart from this all departments on board have in their minds the culmination of their efforts during the whole trip since leaving home, and the picture of their ship steaming into the home port looking her best inside and out, everything spick and span.

The ocean-going tramp ship may enter almost any trade and even circle the world in a round voyage. In practice, however, ships under their respective owners' management are usually to be found specializing in certain trades, primarily because of the knowledge the owners have accumulated of these trades by long experience, and also because, with the intention of concentration on certain trades, special features peculiarly suitable to conditions prevailing in those trades have



REGARDLESS OF NEAR MISSES SHIPS STEAM ON WHILE ESCORTING
Bombs fall among the ships of a convoy which steams resolutely on its way, and an escorting destroyer lays a smoke-screen to make a heavy black protective cloud. The thick pall of smoke will not disperse for a long time. Smoke-floats are sometimes dropped overboard to make this



WARSHIPS LAY SMOKE-SCREENS TO PROTECT THE CONVOY

concealing fog. Dense white smoke can be produced by the use of chlor-sulphonic acid, released from drums at a ship's stern. With modern oil-fired boilers a smoke-screen is easily produced by arranging for the oil to enter the furnaces through a specially adjusted nozzle

been introduced into the ship's design. So, generally speaking, when ships leave outwards from the United Kingdom the owner has in mind a definite round voyage, even if the arrangements for such a voyage have not been completed. Market conditions must, obviously, influence him, and also the law of supply and demand.

Given reasonably normal conditions a ship outward bound for an Eastern Mediterranean destination would follow with a cargo from the Black Sea to the United Kingdom, or U.S.A., or would pass through the Suez Canal to lift a cargo from India or Burma. Alternatively, the ship may be sent to load in Australia.

An outward-bound vessel with anthracite from South Wales to Canada is obviously intended to load a homeward cargo in the River St. Lawrence. To many destinations for homeward loading there is no suitable outward cargo from the United Kingdom, as, for instance, the Pacific Coast of U.S.A. and Vancouver. The ships proceed outwards in ballast.

THE HUMAN ELEMENT

From Vancouver they may load homewards or for Australia, New Zealand, or the Western Pacific. The owner's business is to employ his ship profitably, and with this end in view he aspires to an itinerary which finds the vessel so positioned that the market with the greatest demand for ships is within easy and timely reach.

The ship's company, in their respective spheres, supply the essential requirements in human effort and ability to operate the instrument of sea carriage—the ship. Navigation—withstanding and overcoming the hazards of the sea—maintaining the ship in a condition of seaworthiness which will enable the safe carriage of the cargo and its delivery at destination in good order—in all these matters the crew work as a team. The master has extra responsibilities concerned with the business side of the adventure, and he must also be medical adviser and doctor to the crew when at sea. Repeated experience in a particular sea "trade" gives the master expert knowledge and a preference for that trade. The same with seamen—if a man likes the East he will endeavour to remain with a company specializing in that trade.

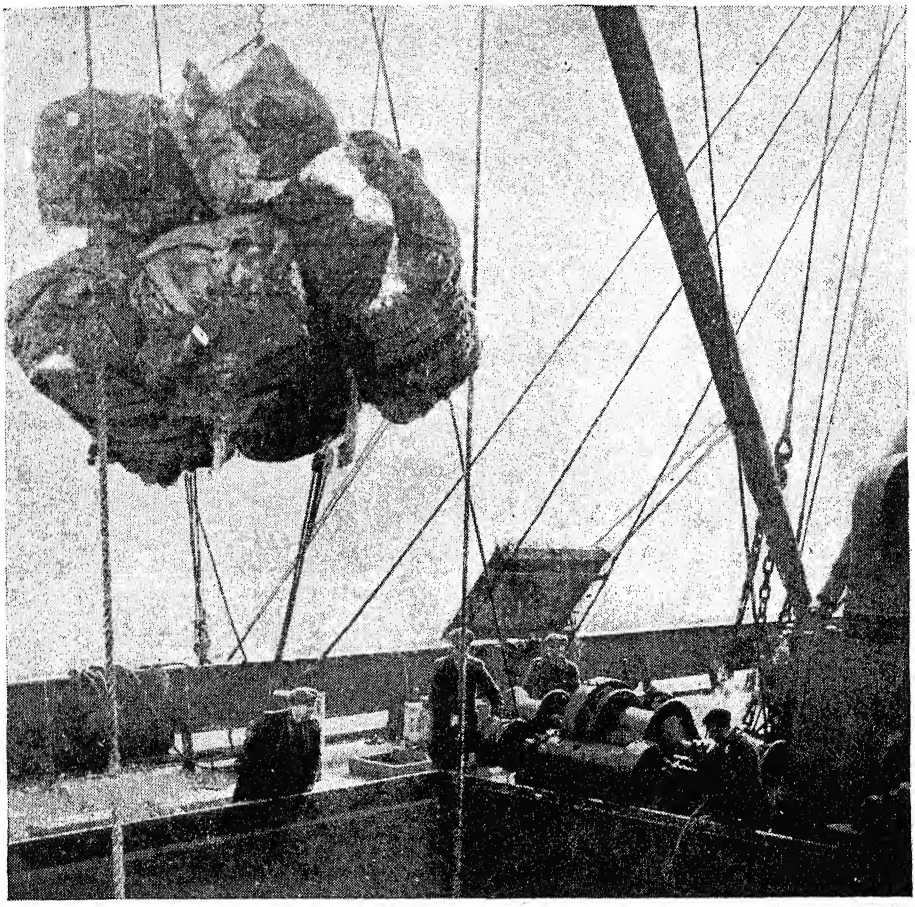
There are ships which stay abroad for long periods trading on the coast of Australia, or between Australia and the Western Pacific or on the Indian coast.

SHORT SEA ROUTES

Then there are what are known as the short sea traders. These are ships of the smaller type ranging from 2,000 tons to 4,000 tons dead weight, which trade regularly from the United Kingdom to North Africa, Spain and France, carrying out coal and bringing home ore, pit props, and sometimes general cargo. Again, there is the home coasting trade—small ships which work between home ports with an occasional trip to Northern France, Holland, or Germany. It is unusual to find seamen changing constantly from ocean-going to coasting ships. They usually settle down in one type or the other. Coasters are known as weekly ships. This means that the crew sign on under a running agreement. It would obviously be inconvenient to sign on and off at the end of each short coastal trip. Another condition peculiar to weekly ships is that the men customarily buy their own food.

Homeward bound! If from the Far East: through the heat and humidity of the Indian Ocean—avoiding, if possible, the monsoons, if it is the monsoon season. A call at Colombo and Port Said for bunker coal or oil, and then through the blue waters of the Mediterranean.

Passing Gibraltar, the ship will fall in with the north-bound traffic from the South Atlantic, and will encounter the Portuguese trade winds, prior to crossing the Bay, with its usual heavy ground



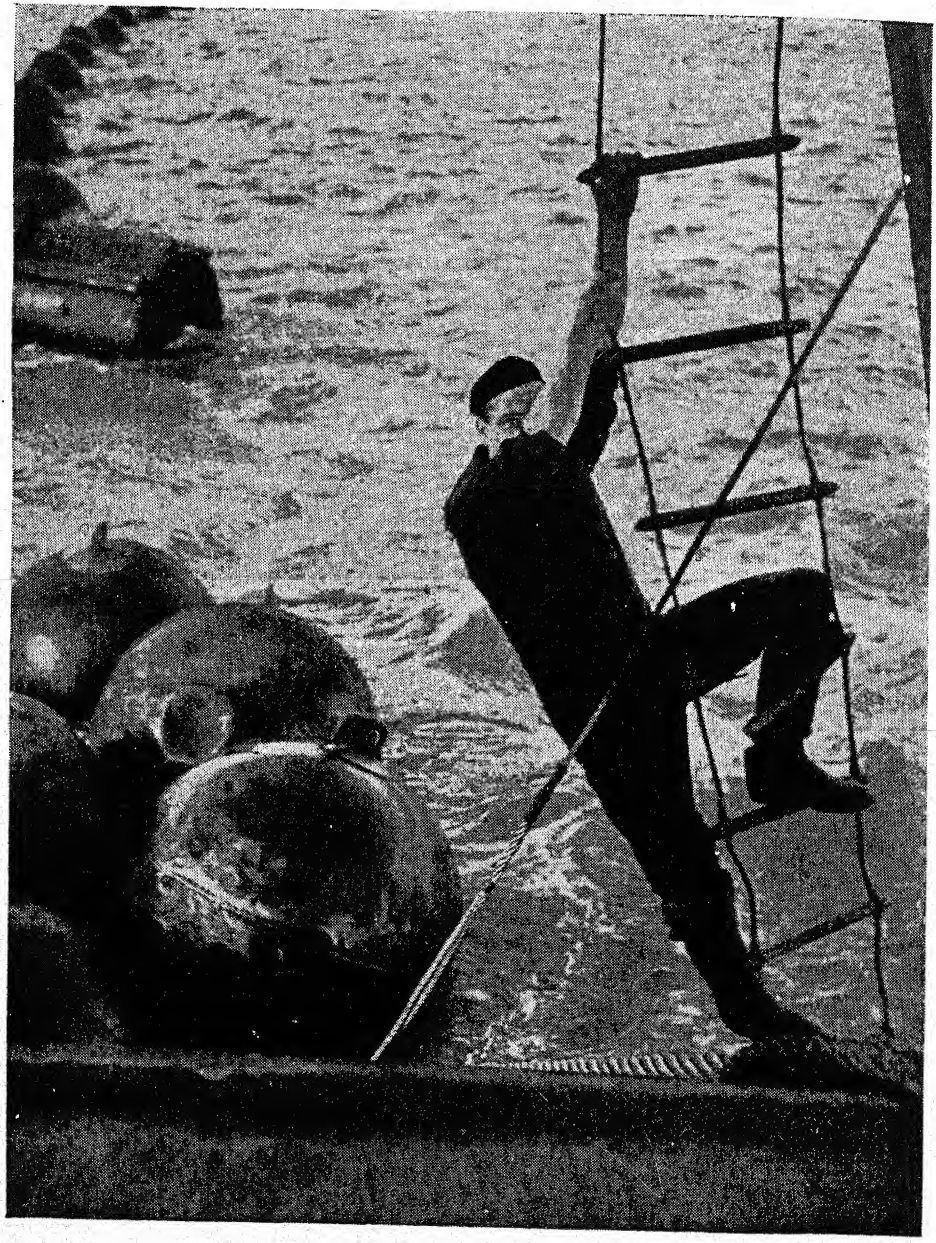
COTTON FROM U.S.A. REACHES A BRITISH PORT

Every ship that successfully braved the perils of the crossing from America and unloaded her cargo in a port of Britain is a unit of victory in the unceasing Battle of the Atlantic

swell. If from the Pacific, then through the Suez Canal and afterwards following the Gulf Stream towards Halifax and the North Atlantic circle (as in the case of homeward-bound ships from the Atlantic States seaboard and Canada), the ship will have the prospect of strong following winds and heavy seas.

All work of maintenance on board is now nearing completion, and except for the effects of wind and water on the hull, the ship is looking spick and span. Approaching the home port, the ensign and house flag are run up. As the pilot cutter on station is sighted the master rings the engine-room telegraph to stand by. Slowly the ship eases down and a rope ladder is lowered to assist the pilot aboard. In her deep sea wanderings the tramp has done another good job.

It will not be long now before the dock is entered and the ship made fast ready to discharge. Now comes the full sense of achievement—the successful completion of a purpose, of a most vital purpose, without which our country could not live.



BOOM DEFENCES TO GUARD HARBOURS

All harbours containing shipping have boom defences miles long, consisting mainly of anti-submarine and anti-torpedo nets, making a strong steel mesh curtain from the surface to the sea-bed. Constant attention is necessary to keep the boom in good order, and men of the boom defence repair ships are constantly at work in all weathers. Spherical floats keep the nets on the surface. Here a man of the boom defence is preparing to haul in some of the floats for repair

CHAPTER 10

How Britain's Merchant Navy Was Built Up

Pioneers of the shipping industry. Earliest steamships. From beach boy to shipowner. How the P. & O. started. First Atlantic fleet of mail steamships. Samuel Cunard's dreams. The Atlantic mail contract. Donald Currie and the Union Castle Line. Royal Mail Steam Packet Company. The load line. Great Scots shipowners. Safety at sea.

Oh, where are you going to, all you big steamers
With England's own coal, up and down the salt seas?
We are going to fetch you your bread and your butter,
Your beef, pork, and mutton, eggs, apples and cheese.
For the bread that you eat and the biscuits you nibble,
The sweets that you suck and the joints that you carve—
They are brought to you daily by all us big steamers,
And if anyone hinders our coming you starve.

RUDYARD KIPLING.

OF all the industries of Britain, shipping is the most adventurous, hazardous and romantic. "Yes," you may answer, "the officers and men must have a sense of adventure or they would never go to sea. They must face the perils of storm and fog. Their ships may possibly be cast ashore or posted at Lloyd's as 'missing.' But what is there romantic about those who manage the ships from their offices ashore?"

Let me tell you that there is a great deal of romance about the shipowners, the business men behind the ships. The ships they look after are really the property of hundreds, or even thousands, of investors; the Cunard Company, for instance, has as many as 9,000 shareholders on its books.

A shipowner, or manager, in the ordinary course of his business, has to be something of a financier, lawyer, accountant, linguist, engineer, ship designer, ship repairer, store dealer, and coal and iron expert. He must study the map of the world, particularly if he is a tramp owner, and know all about the produce of all countries. When war is on and his property is requisitioned by the Government, the shipowner must also be a bit of a politician, diplomat, underwriter, and philosopher—and business man as well.

British shipping has always been individualistic, resisting attempts of the Government to go beyond its obvious duty of ensuring that the ships are thoroughly seaworthy, and that officers and men are fit for their tasks. The shipping industry has great family traditions, represented by the Booths, the Holts, the Allens, the Bibbys, the Ropners, the Harrisons, the Hogarths, the Reardon-Smiths, the Runcimans, and many others, while some pioneers have hidden their identity, as with the P. & O., Royal Mail, Orient, Clan, Union Castle, and White Star. But whatever the designation which was chosen by the founders of a particular shipping business, its success depended on the initiative of a few men.

In many cases it depended on one man of progressive ideas, courage and business ability. Usually, the pioneer had very limited financial resources, and had to scratch up the money for acquiring his first ship as best he could, in many cases aided by friends who had faith in his star.

LOSSES IN EARLY DAYS

In the days of the sailing ship the shipping industry was very precarious. Vessels loaded with costly cargoes would put out from their home ports amid the cheers of well-wishers, and after they had passed over the horizon the owners would know little or nothing of them for many months, since the mail services were slow and irregular, no cabling facilities existed, and wireless telegraphy was unthought of. It is understandable that in those days many fine ships were posted at Lloyd's as missing—nothing having been heard of them since they put to sea.

Nowadays, ships are rarely lost without trace, for owners are able to keep in constant wireless touch with them as they proceed on their voyages. The voyages, too, are more regular, as they depend for propulsion on the steam-engine instead of the wind. Sailing ships, even the crack clipper ships, would often get into "the doldrums." In those days seamen had to study the wind, for owners' profits, and often their own share of them, depended on the ships carrying as much canvas as they could safely spread, and their own lives depended on not spreading too much.

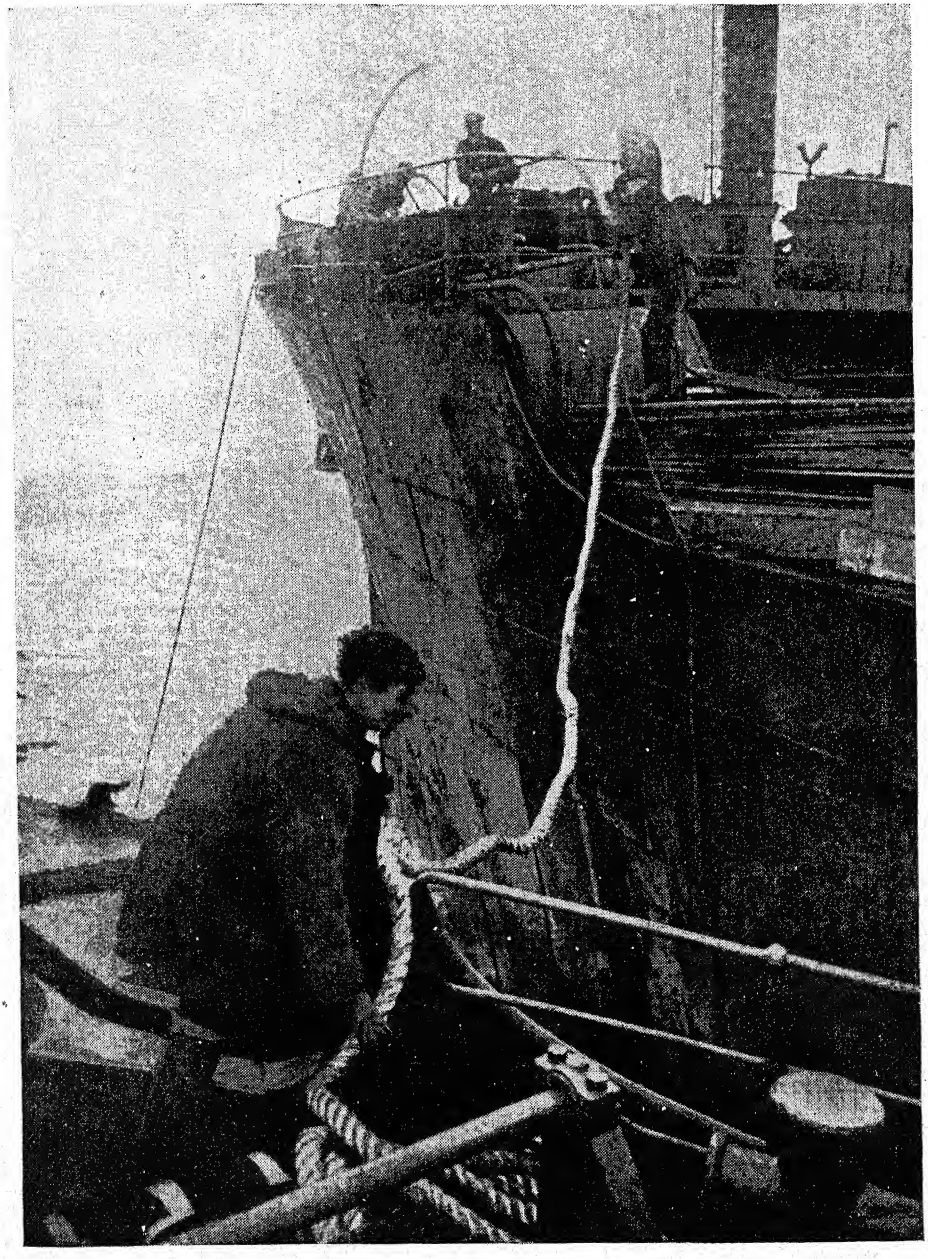
Who today knows the definitions which were familiar then? A 7-mile wind was a gentle air, 14 miles a light breeze, 21 miles a good steady breeze, 40 miles a gale, 60 miles a heavy storm, and 80 to 150 miles a hurricane which carried everything before it. The aim of an experienced sailor in the Atlantic and Pacific oceans was to pick up a steady "trade wind" which would send him bowling along with little thought or chance of disaster. What navigators then feared most, as likely to delay them, were the regions of calm, where the north and south trade winds in the two great oceans meet. When hindered in this way the sailors described themselves as being "in the doldrums," and abandoned hope of making a fast passage with the tea, or wood, or other cargo, so as to reach port before the market was flooded with goods brought in by ships which had been luckier, or had been better sailed. Nor were the "doldrums" the only trouble, for fogs were as frequent then as now, and the coasts were not as well lighted as they are today.

Life in the sailing days was full of danger and uncertainty, and the risks appealed to the seamen, as well as to the investors, of Britain. In following the sea, the seamen staked their lives, and their financial backers staked their money on a voyage as lightheartedly as a man will now stake a few pounds on a horse, or a few pence in a football pool. There were always plenty of volunteers for the merchant ships, where discipline was dictated only by the perils of the sea, and wind, and fog—and there were "no frills."

WHEN THE PRESS GANG RULED

Less desire was shown to join the Royal Navy. Men-of-war, in addition to the hazards which confronted merchant seamen, were exposed to the fury of the enemy, and often to brutal punishments for slight infringements of the King's regulations. In such circumstances the Press Gang had very often to be invoked in order to provide British men-of-war with crews in time of war.

Queen Elizabeth declared the seas to be free to all sailors, but the traffic upon them was on a small scale until the marine steam-engine was invented. As early as 1802 some enterprising Scotsmen were impressed by the possibilities which were opened up when the first practical steamship, the *Charlotte Dundas*, was built for



HELPING CRIPPLED SHIPS HOME

Every damaged ship saved and made seaworthy for service again is a victory over the enemy, and the crews of rescue tugs work under great difficulties to beach a crippled ship safely in a harbour mouth if they are unable to bring her to a quayside. Then the Admiralty Salvage Officer takes over. Here a strong line from a rescue tug is being taken aboard a torpedoed ship

use on the Forth and Clyde Canal. Her success was followed by the *Clermont*, which made the journey from New York to Albany, a distance of 130 miles, in thirty-two hours. But the ship was regarded only as an interesting experiment.

EARLY ATLANTIC STEAMSHIPS

A contemporary newspaper, the *Evening Sun* of New York, described how the *Clermont* "moved out into the stream, the steam connexion hissing at the joints, her crude machinery thumping and groaning, the wheels (paddle-wheels) splashing, and the smoke-stack belching like a volcano." She was described as "a monster moving on the water, defying the waves and the tide, and breathing flames and smoke." That was in 1807.

Ten years were to pass before the wooden-sailing ship *Savannah*, with a steam-engine for use when the wind failed her, crossed from the United States to Liverpool; and nearly twenty more years elapsed before the age of steam navigation on the Atlantic opened with the sailing of the *Sirius* and *Great Western* from England to the United States in just over a fortnight, a wonderful exploit at that time.

But even then there was a good deal of scepticism as to the possibility of the steamer, dependent on costly coal, competing successfully against the sailing ship, which got its power from the wind for nothing. The Sea Lords at the Admiralty were fiercely opposed to the steam-engine, and many business men were not easily convinced that the sailing ship was about to be driven off the seas. To some extent the sceptics were right, for it was many years before the tonnage of steam-propelled ships exceeded that of the sailing ships. In the eighteen-fifties, however, the Government decided that the mails going overseas from British ports could be carried more quickly and regularly by steamers. That decision marked a notable turning-point in the history of shipping. The industry then increased in national importance owing to the increased demand for raw materials for the factories, and for food for the workers in them, for the British farmer could not supply them with all the corn and other things they required at the prices they were prepared to pay.

Thus, the shipowner, as we know him today, came on the stage. Shipowners do not have an easy life. They are not the masters of their own fortunes or misfortunes. Nature plays games with them at sea, with the result that their ships are lost. Again, the countries whose trade they have fostered by providing efficient and cheap transport may suffer financial or industrial reverses, as, for instance, the revolutions which occurred so frequently at one period in South America, disorganizing all trade at home and overseas.

They may make big profits during a "boom." But then will come a period, usually a long one, when it will be difficult to make ends meet owing to the falling off in the number of passengers who wish to travel, or the decline in the volume of cargoes to be carried from port to port. Consequently, wise shipowners are rather like squirrels—they store up in the summer the resources they will need in the winter. In times of prosperity they put by money to enable them, first, to withstand the losses in the years of depression; and secondly, to build more efficient and economic ships in place of their older vessels which are wearing out. Conservative finance has been the secret of the success of British shipping.

START OF THE "P. & O."

My claim that the shipowner is a romantic figure in industry can be supported by relating the story of Arthur Anderson, who, in association with his less daring partner, Brodie Willcox, founded the Peninsular and Oriental Steam Navigation Company, which opened up trade to the East, and especially to India.

In order to appreciate his achievements it may be added that today, what is now known as the "P. & O. Group" is one of the most important shipping combinations under any national flag. It embraces the British India Steam Navigation Company, Ltd., the Eastern and Australian Steamship Company, Ltd., the Federal Steam Navigation Company, Ltd., the Hain Steamship Company, Ltd., the New Zealand Shipping Company, Ltd., James Nourse, Ltd., the Orient Steam Navigation Company, Ltd., and the Strick Line (1923), Ltd., as well as, of course, the P. & O. Steam Navigation Company. Other companies are also included in the group as, for instance, the Union Steamship Company of New Zealand.

FROM BEACH BOY TO PARTNER

To trace the beginning of this group, in which each company still preserves its own identity, we must go back one hundred and fifty years, to the bleak Shetland Islands, which were mainly occupied by poverty-stricken men enjoying few of the necessities and none of the conveniences of life. A visitor at that time to Bressey, which adjoins Lerwick, might have seen a beach boy named Anderson, in his early teens, scrubbing and washing the fish which had been landed that morning. This lad also had to run messages for his employer, Mr. Thomas Bolt, a general merchant and fish-curer, and on occasions row him across the sound to Lerwick, the business centre of the Shetlands. It was not a promising opening to the career of a man who was to become one of the outstanding figures in the history of British shipping.

Anderson was ambitious. Though there was no school at Bressey for such as he, the boy had had some education from a local parson. In his spare time he read any books on which he could lay his hands. His employer, pleased with the way he did his dull work, at length took him into his office, and there he gained a knowledge of business methods. But the lad wanted adventure. Before he was sixteen years of age he secured a passage to Portsmouth, where, by the influence of Thomas Bolt, he entered the Royal Navy, became captain's clerk and sailed for the Baltic.

When this cruise came to an end, Anderson returned to Portsmouth. He was discharged from the Royal Navy, only to find that no one in the town had any job by which he could earn his living. So he walked to London, penniless and friendless. For a time he found that London had no more use for him than Portsmouth.

Eventually, however, through the influence of an uncle, he entered the office of Brodie Willcox, a London shipbroker in a moderate way of business. Anderson revealed himself as a genius in shipping affairs, and within seven years Willcox made him his partner. Though still young, he soon became the leader in the firm. Keen and ambitious, he was ready for any adventure that promised a profit.

The first investment of the firm was an American schooner, which had stranded at Dover. A revolution was running its course in Portugal, with which country the firm had business links. With Anderson on board, the schooner, after having been refitted, set sail with a cargo of ammunition for Lisbon. Anderson took a gallant part in winning the throne for the young Queen, Dona Maria. Thus he gained, in a literal sense, "a friend at court." He returned to London with dreams which would have seemed utterly impossible of attainment to a less courageous man.

CONTRACT FOR MAILS

His first act was to form, in 1837, the Peninsular Steam Company. His second was to secure the contract for carrying the mail every week from Falmouth to Gibraltar, with calls at Vigo, Oporto, Lisbon and Cadiz, the Government agreeing to pay a subvention of £29,600 a year.

Later, the name of the company was changed to The Peninsular & Oriental Steamship Company. "To Arthur Anderson and the Melbourne Ministry of 1835-41 must be given the credit for a complete break with tradition, which had an effect which neither of them can have contemplated. It is hardly too much to say that the contract drawn up between them in August, 1837, laid, quite unconsciously, the foundations of the modern British mercantile marine, which most of us have been brought up to regard with some national pride." (From *British Shipping*).

STORY OF THE CUNARD LINE

It is unnecessary to trace in detail the subsequent history of this line. The directors had to fight against the conservatism of Government departments as well as the monopoly of the East India Company, then on its last legs. But Anderson and the colleagues he had gathered round him were undaunted by obstacles, and in later years, with the former beach boy as chairman, the P. & O. Company extended its services. He lived to see P. & O. ships navigating not only the Mediterranean, but also the Red Sea and the Indian Ocean, with a service to China. And the P. & O. possessed its own repairing depots at Malta, Suez, Alexandria, Aden, Bombay, Calcutta, Hong Kong, Shanghai, and Point de Galle.

The names of Anderson and his partner, Brodie Willcox, are forgotten; their identity was merged in the title of the shipping company which they founded. It was otherwise with Samuel Cunard. Of all names associated with the shipping industry none, perhaps, is so familiar, for the company he founded won, held for many years, and still held on the outbreak of war in 1939, the Blue Ribbon of the Atlantic, unquestionably the premier trade route of the Seven Seas.

Consider the romance of Samuel Cunard, the shipowner who dreamed great dreams, and of the company he founded. There was nothing in its early history to suggest that the time would come when it would represent the prestige of this country on the sea route over which more passengers pass, and in a greater measure of comfort and even luxury, than on any other. The passenger liners *Queen Mary* and *Queen Elizabeth*, of 81,233 tons and 85,000 tons respectively, may be regarded as monuments to the progressive spirit of Samuel Cunard, who was responsible for the building of the first Atlantic fleet of mail steamships, the *Britannia*, *Arcadia*, *Caledonia* and *Columbia*. Each of these was little over 1,000 tons, with a speed of about 8½ knots as compared with 28½ and 30 knots of the great ships which, under conditions of peace, can cross the Atlantic in a shuttle service in about four days.

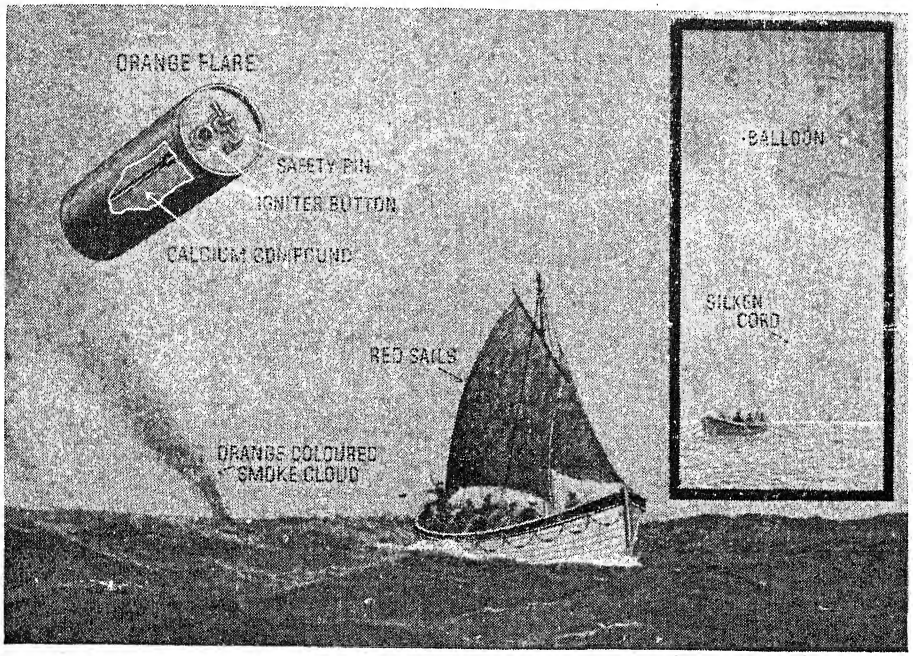
Samuel Cunard had already celebrated his fiftieth birthday when he determined to create a bridge of ships across the North Atlantic. He was living in Halifax, Nova Scotia, earning what was apparently a sufficient income by running sailing ships from Boston and Newfoundland to Bermuda. There was no reason why he should put his whole future to the hazard by founding a shipping company in England, the success of which would depend on his optimistic belief in the development of traffic between the two branches of the English-speaking world.

SAMUEL CUNARD'S SUCCESS

But he had faith in the marine steam-engine, and when he read an advertisement for tenders for the conveyance of the mails between England and the United States he decided that his day had dawned.

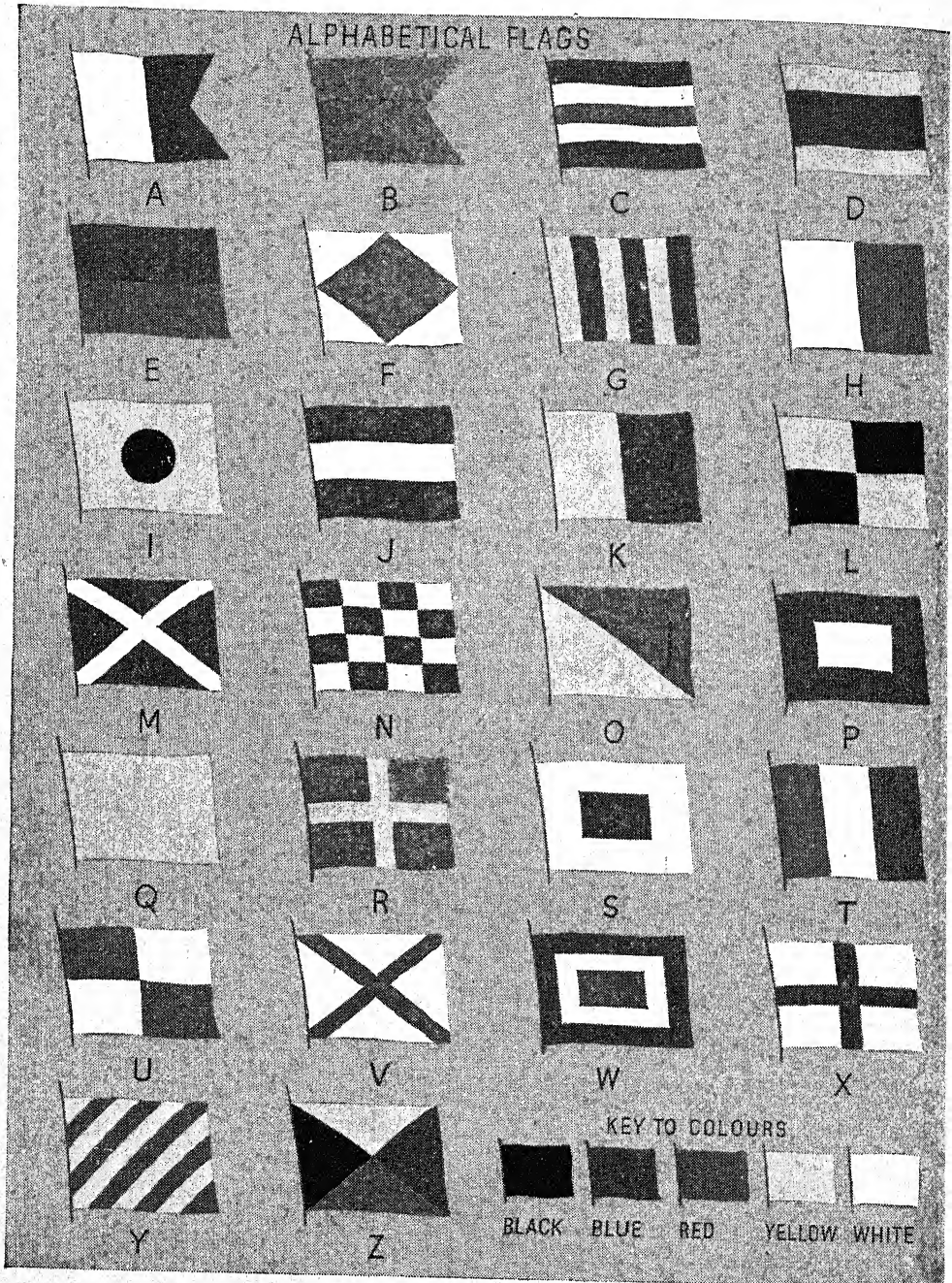
He appears to have had only one influential friend in England when he crossed the Atlantic to submit his tender —the Secretary of the East India Company. The success of his mission represented a triumph over difficulties which

would have defeated a man of less vision and courage, for it was generally assumed that the mail contract would be secured by the owners of the famous *Great Western*, of 1,340 tons, the largest steamship which had been built up to then. Cunard was undoubtedly fortunate from the day he landed. He secured an introduction to the pioneer marine engineer of the day, Robert Napier, who was impressed with his ambitious scheme. At that time George Burns and Donald McIver who, for some time, had been the owners of rival lines of coasting steamers plying between Glasgow and Liverpool, had just amalgamated their business, and were ready for some fresh adventure. Napier suggested that Cunard should talk the matter over with them. Experienced shipowners, they caught his enthusiasm and promised their ungrudging support. When Samuel Cunard had all his plans "cut and dried," he submitted his tender to the Government for the new mail service. It was accepted, to the great chagrin of the owners of the *Great Western*, and it was agreed to pay him £50,000 a year. The next step was to raise what, in those days, was regarded as a large sum of money to pay for the ships which were needed. Burns, McIver and Cunard got together, and it was agreed that the two former should buy a half-share in the contract for £25,000 and form a separate company to raise that sum. But the arrangement was clumsy and not likely to work well. So a new scheme was evolved, a co-partnership, with a capital of £270,000; Cunard was one of the partners and consented to surrender the contract in return for shares. The canny Glasgow business men made it a condition of the co-partnery, as it was



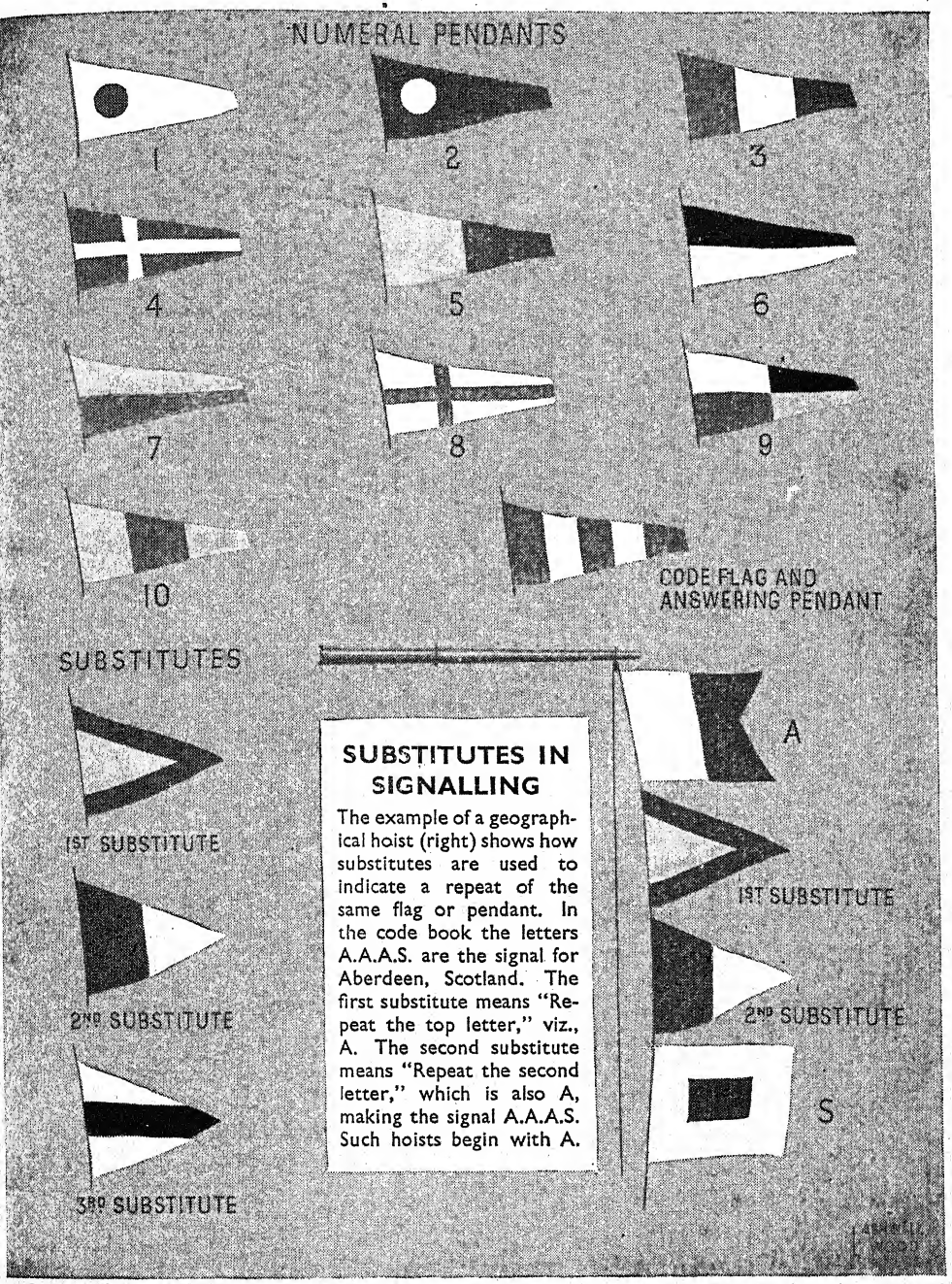
EMERGENCY EQUIPMENT FOR LIFEBOATS

Lifeboats must now carry red sails and special equipment, including buoyant smoke signals. Thrown on the water, these give off orange-coloured smoke which can be seen several miles away. Lifeboats also carry small balloons (inset) which rise on a silken cord to a great height



FLAGS USED IN THE NEW INTERNATIONAL CODE

The new International Code of Signals has been translated into English, French, German, Italian, Japanese, Spanish, and Norwegian. Nautical and technical phrases are adjusted so



SUBSTITUTES IN SIGNALLING

The example of a geographical hoist (right) shows how substitutes are used to indicate a repeat of the same flag or pendant. In the code book the letters A.A.A.S. are the signal for Aberdeen, Scotland. The first substitute means "Repeat the top letter," viz., A. The second substitute means "Repeat the second letter," which is also A, making the signal A.A.A.S. Such hoists begin with A.

SPEAK IN SEVEN DIFFERENT LANGUAGES

that correct information can be exchanged between people not speaking the same language. Substitutes (inset, above) indicate a repeat of the same flag or pendant in a hoist

called, that if they did not get 15 per cent on their investment, Cunard was to make good the deficiency out of the £50,000 which had been credited to him as the value of the mail contract.

In these circumstances, with the backing of the Government, the British and North American Steam Packet Company came into existence. The name was afterwards changed to the Cunard Steamship Company. The prospects were not too promising, but events proved that the foundations had been well and truly laid, for, it Cunard was a business-like dreamer, his partners brought to the adventure all their hardly won knowledge and years of experience as shipowners. The Company became famous for the speed of its ships, for the comfort provided for passengers, and for their safety. It is the proud boast of the Company that no life has ever been lost in any of its ships under peace conditions.

The Company has never been afraid of new departures in design and building. Early in its career the screw was adopted in place of the paddle; compound engines were fitted soon afterwards, and the Company was a pioneer in the fitting of the turbine, which many shipowners regarded as suited only to men-of-war.

Samuel Cunard lived until 1865, and had the good fortune to see the dreams which he had nurtured in far-off Nova Scotia more than realized. His company is now the pivot of what is known as the "Cunard group," which includes the Port Line and Thos. & Jno. Brocklebank.

UNION CASTLE LINE

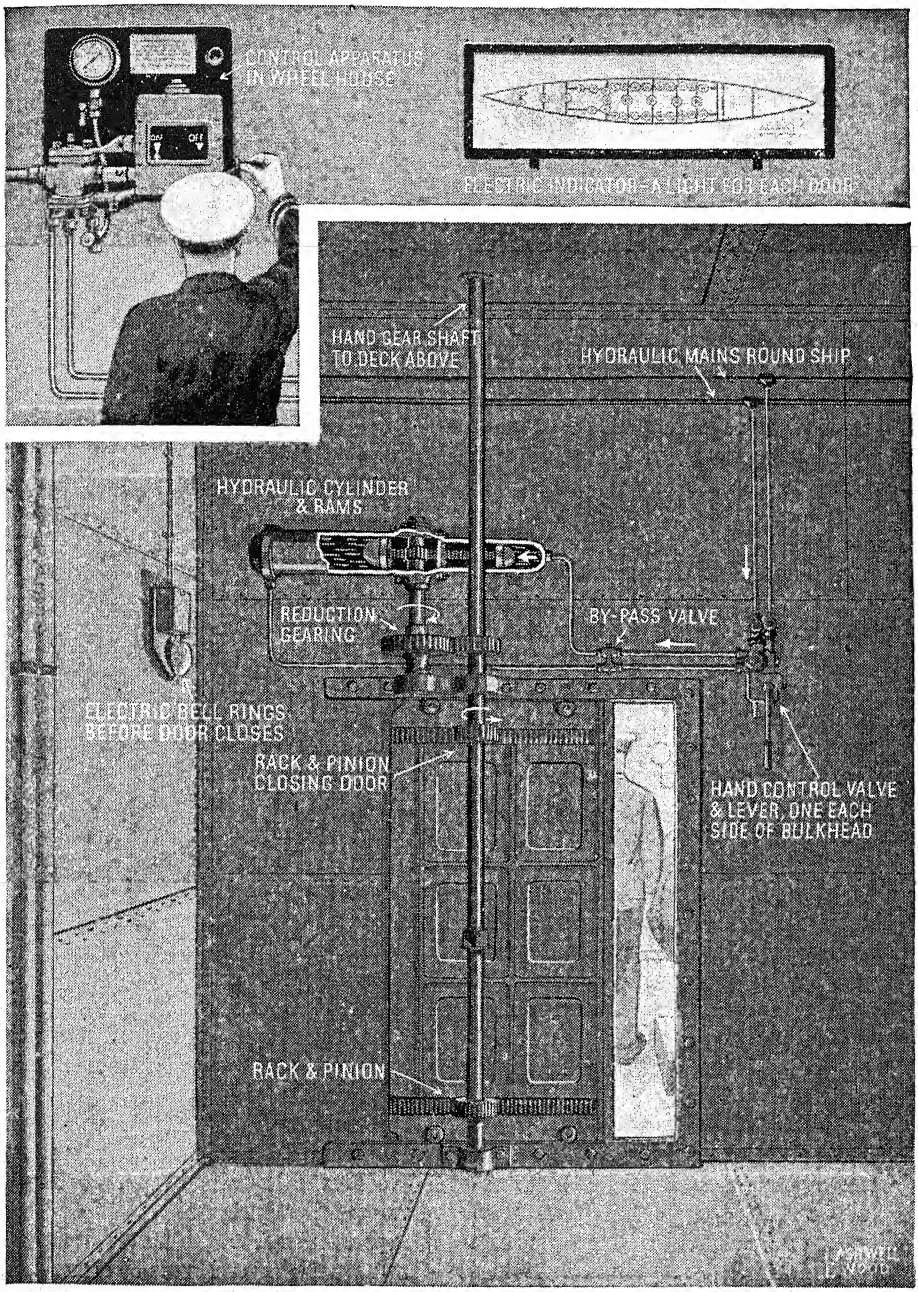
The story of Samuel Cunard's achievement in founding the Cunard Company would not be complete unless something was said of the establishment, by Donald Currie, of the Castle Line, which, owing to its amalgamation with the Union Steamship Company, is now known as the Union Castle Line. Donald Currie was a native of Greenock, where he was born in 1825. He came from a poor home, and there was nothing to suggest that he would found a fleet, enter Parliament, and become a national figure. When still a youth he entered a local shipping office, but it offered little scope for his ambitions. So, when only eighteen years of age, he left his native town for Liverpool, then entering upon a period of great prosperity. What idea prompted young Donald Currie to abandon his sure employment at Greenock for the uncertainties of keen competitive life in the great shipping city south of the border, we do not know.

TRADE WITH SOUTH AFRICA

But his intuition was not at fault. He obtained employment in the office of the Cunard Company. Currie was only twenty-five years of age when he was appointed its agent at Havre, to challenge the monopoly hitherto enjoyed by the Americans. Currie won his spurs by securing a large share of the freight traffic between France and America.

His success encouraged his employers to entrust him with pioneer work of a somewhat similar character at Bremen and Hamburg. Then they came to the conclusion that Currie, with his experience on the Continent, could be better employed in the head office at Liverpool. So about 1856 Currie moved back to Merseyside, and for the next six years was immersed in the affairs of the Cunard Company, still nursing the ambition to become a shipowner himself. He decided, however, that if ever he achieved his ambition he would not enter into competition with the Cunard Company, which had given him the first chance to study shipowning.

The mail service to South Africa was then operated by the Union Steamship Company, which had been formed in 1853 as the Union Steam Collier Company, a humble origin for a concern which was to link this country with South



WATERTIGHT DOORS CONTROLLED FROM THE BRIDGE

Ships are divided into a number of watertight compartments so that the whole ship will not be flooded in the event of a collision. These compartments are fitted with watertight doors which can be opened or closed hydraulically from the bridge. In foggy weather they are kept closed

Africa and assist in its industrial development. The Union Steamship Company had the mail contract and its agencies all over South Africa. It was in a very strongly entrenched position.

But Currie decided to challenge its monopoly, as he had challenged the monopoly of the Americans when he was the Cunard agent at Havre. By this time he had made many friends, not only in Liverpool and London, but abroad. So he threw down the gauntlet to the directors of the Union Steamship Company.

He determined to build four steamers. So impatient was he to take advantage of the developing trade with South Africa that before the *Edinburgh Castle*, the *Windsor Castle*, the *Walmer Castle* and the *Dover Castle* were ready for sea he chartered two other steamers, the *Iceland* and the *Gothland*, with which he inaugurated his sailings from Southampton to the Cape of Good Hope in January, 1872 —four years before the Union Company's mail contract, no mean aid in running ships to and from South Africa, was due to expire. In the meantime he made friends at the Cape, and was, at last, given the contract to carry the homeward mail.

But the greatest triumph was still to come: the competition for the subsidy paid by the British Government. What would happen? In the result the Government decided that Currie's enterprise should be rewarded by allowing him to have half the mail subsidy, the other moiety being allotted to his older rival.

RIVALS AMALGAMATE

Though Currie afterwards entered the House of Commons as M.P. for Perthshire, his mind was still occupied with shipping problems. His first love was still the steamship company which he had founded. It continued to prosper under his leadership, and, at last, in 1900 he and Sir Francis Evans, of the Union Steamship Company, agreed to call a truce to rivalry on the South African route, which had cost both concerns no mean sum. So the two fleets were amalgamated under the title of the Union Castle Steamship Company, Sir Francis becoming a director of the amalgamated companies and his former competitor chairman. Thus it happened that when the young clerk from Greenock died he had successfully founded a great steamship line and had swallowed the rival company, entrenched in a safe monopoly, which he had had the amazing courage to challenge.

ROYAL MAIL COMPANY

For Scotsmen shipping has always had an attraction; perhaps it is because they are romantic as well as adventurous. Who today remembers that other Scotsman, James MacQueen, who was the founder of the P. & O. line of the western seas—the Royal Mail Steam Packet Company? At an early age he left his home in Crawford, Lanarkshire, with little except his brain as capital, and before he had reached his majority was managing a sugar estate at Grenada, one of the West India Islands. But his passion was travel. He acquired an encyclopædic knowledge of the Spanish Main, its islands, its ports and its undeveloped wealth. Some chance event led him to return to Scotland, where he settled in Glasgow. Here he edited the *Glasgow Courier*, but his heart was not in the work. He seized every opportunity to go overseas, and he suffered all the trials of voyages in ships whose chief merit was that they could float.

The mails to the West Indies were then carried from Falmouth by the Admiralty, in what were known as "coffin ships," sailing vessels which were as slow as they were uncomfortable; the letters were distributed to the larger islands by old 10-gun brigs into which steam-engines of 100 horse-power had been fitted. The cramped saloons in these brigs, which were placed over the boilers, were lighted,

of course, by oil lamps which swung to and fro as the ship pitched or rolled, giving off the familiar smell of this means of lighting, and they were without ventilation. The boilers used up vast quantities of coal, and when the capacious bunkers were being filled, the passengers had either to remain amid the coal-dust on deck, gradually taking on the appearance of negroes, or retreat to the airless saloon, however high the temperature.

MacQueen was a dreamer as well as a geographer and journalist, but where business men merely grumbled, he acted. In the year 1837 he submitted plans to the Government for a steam packet service —incidentally describing the Admiralty's ships as "a disgrace to the country."

His first overtures were not well received, but, nevertheless, he persevered with his ideas. Eventually he drew up a generous scheme for a mail communication between Great Britain and the eastern and western parts of the world, as well as Canton and Sydney, providing, incidentally, for the canal through the Central American isthmus, constructed many years later—after surmounting great difficulties—the Panama Canal.

POST OFFICE SUPPORT

He was not content to have his plan pigeon-holed and forgotten, but took the nation into his confidence, and soon gained the support of business men. He told them that "mails can never be carried either regularly or with certainty in vessels, the chief object and dependence of which is to carry merchandise," thus foreshadowing the luxury liners of later years. "Steamboats carrying mails," he went on to plead, "should be the mail coaches of the ocean, limited, as mail coaches on land are, as to cargoes." He summed up the matter in these words. "The object being a national one, it ought to be carried into effect by the nation," and he urged that "no narrow or parsimonious view should be tolerated"—this appears to have been an obvious hit at the Treasury.

At the Post Office there was a man, Rowland Hill, who held much the same progressive views. Under the influence of these men of vision and in face of much opposition, the Government at last capitulated, the penny post was introduced in the British Isles, and tenders were sought for carrying the mails more or less in accordance with MacQueen's ideas, to the West Indies, North America, and the Far East. MacQueen's dreams were justified.

SUBSIDY FROM THE ADMIRALTY

But before this surrender to the all-conquering steamship, MacQueen had laid the foundations of the Royal Mail Company in 1839. He had gained the ears of the members of the West India Committee, which had existed in London since 1760, for large fortunes were made out of these dependencies in the eighteenth century. The Committee consisted of planters and merchants who had long been dissatisfied with existing shipping services, and were determined to improve them.

They were, at last, convinced that MacQueen's dream might become a reality; but they evidently had no high opinion of the dreamer's business ability; he was not made a director of the Company, but was grandly described as "General Superintendent of Affairs."

His first task was to obtain a Royal Charter. The Royal coat of arms was adopted as the company's seal, which was to be seen henceforth on all its ships, the noblest and the most humble, as well as on its tariff of charges. MacQueen's next act was to secure a subsidy from the Admiralty for a service of steam packets to Barbados, Grenada, Santa Cruz, St. Thomas, Nicola Mole, Santiago de Cuba, Port Royal, Savannah le Mar and Havana, with branch services to all the smaller islands as well as to New York and Halifax. Thus the Royal Mail Steam

Packet Company started on its long career.

The coming of steam gave a fillip to the British tramp ship—the ship which tramps the seas to pick up a profitable bulk cargo wherever one is on offer.

The tramp ship was the product of the industrial progress of this country. Many raw materials were demanded from overseas which had not been needed before, and the population, owing to the prosperity of the country, increased so rapidly that the soil of the British Isles could not produce all the food that was required; so, much of it had to be bought overseas, and, of course, in the cheapest overseas markets. The number of men, women and children in Great Britain in 1811 was only just over 10,000,000, but by the end of the century the figure had increased to upwards of 30,000,000, and in 1942 it had risen to not far short of 50,000,000.

As grain and other things were obtainable by the industrial workers at a small outlay, employers could keep their wages down, and the products of their industry could compete successfully with those of other countries—so successfully that year by year the national trading account showed a favourable balance. This was invested in the Dominions and in foreign countries in development schemes. Investors thus obtained higher rates of interest than British concerns would pay for their capital. It became a matter of exchange of British manufactures and coal for raw materials and food.

ERA OF NATIONAL PROSPERITY

The foundation of this economic structure was freedom of trading. No taxes were levied in order to keep imports out of British ports, and no restrictions were placed on foreign ships which carried immense quantities of commodities to and from the British Isles.

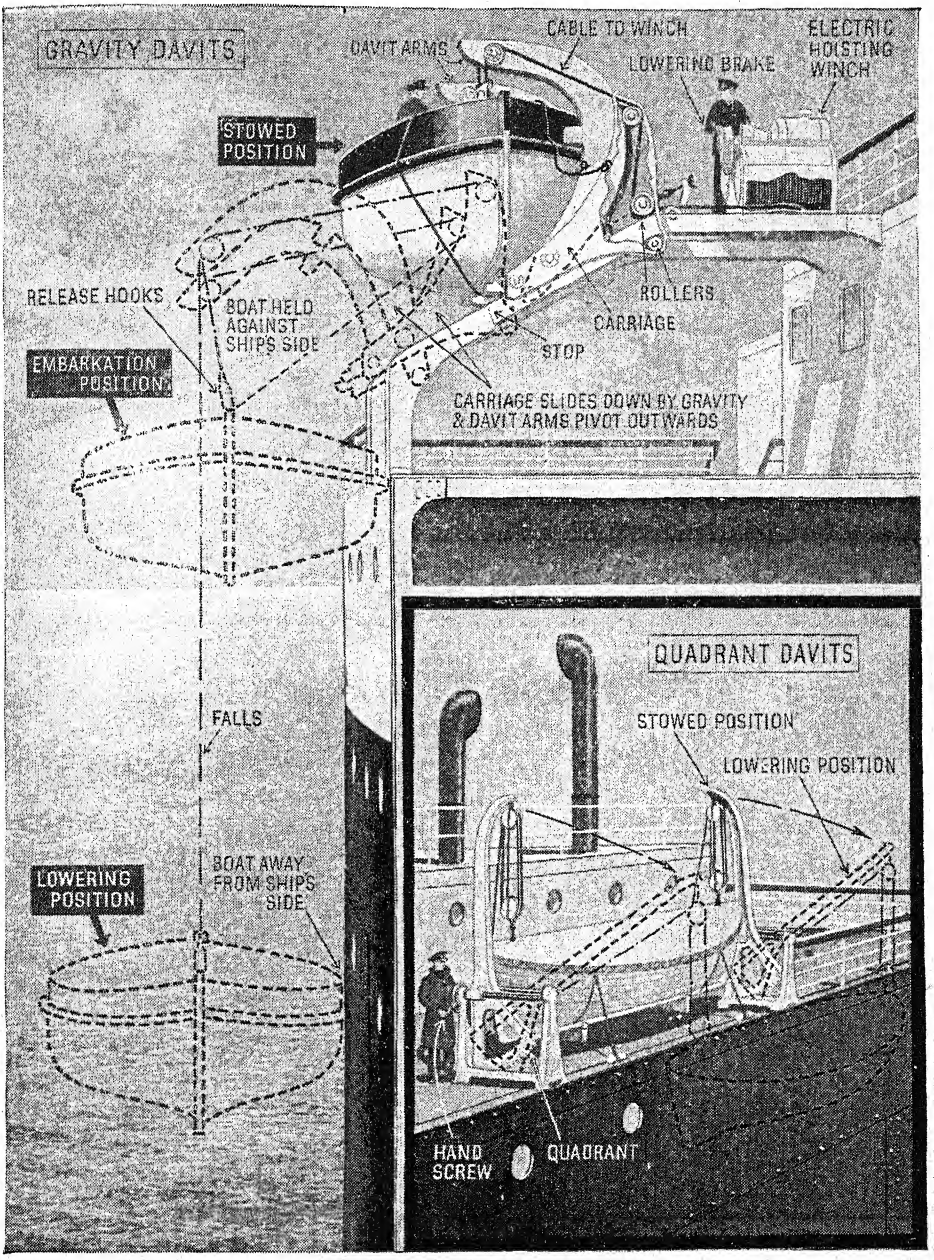
To the satisfactory trading position of the country early in the nineteenth century, the tramp ship made a great contribution. It was built cheaply and operated cheaply. It was the expression of individual enterprise. Napoleon once declared that "in war it is not so much the men as the man that counts." That dictum also applies to tramp shipping, perhaps, more than to passenger liners, for the founder of practically every fleet of tramp ships was a seaman, or a clerk in a shipping office, with no capital but his brains, his shrewdness and his determination to improve his own position in the world.

TRAMP SHIP OWNERS

Lord Runciman, Sir Edward Nicholl, Sir William Reardon-Smith, Sir Edward Hain—all of them now dead—may be quoted as among the shipowners who began life as lads before the mast. There is talk these days of equality of opportunity. Each of these seamen, with no silver spoon in his mouth, made his own opportunity, and achieved success.

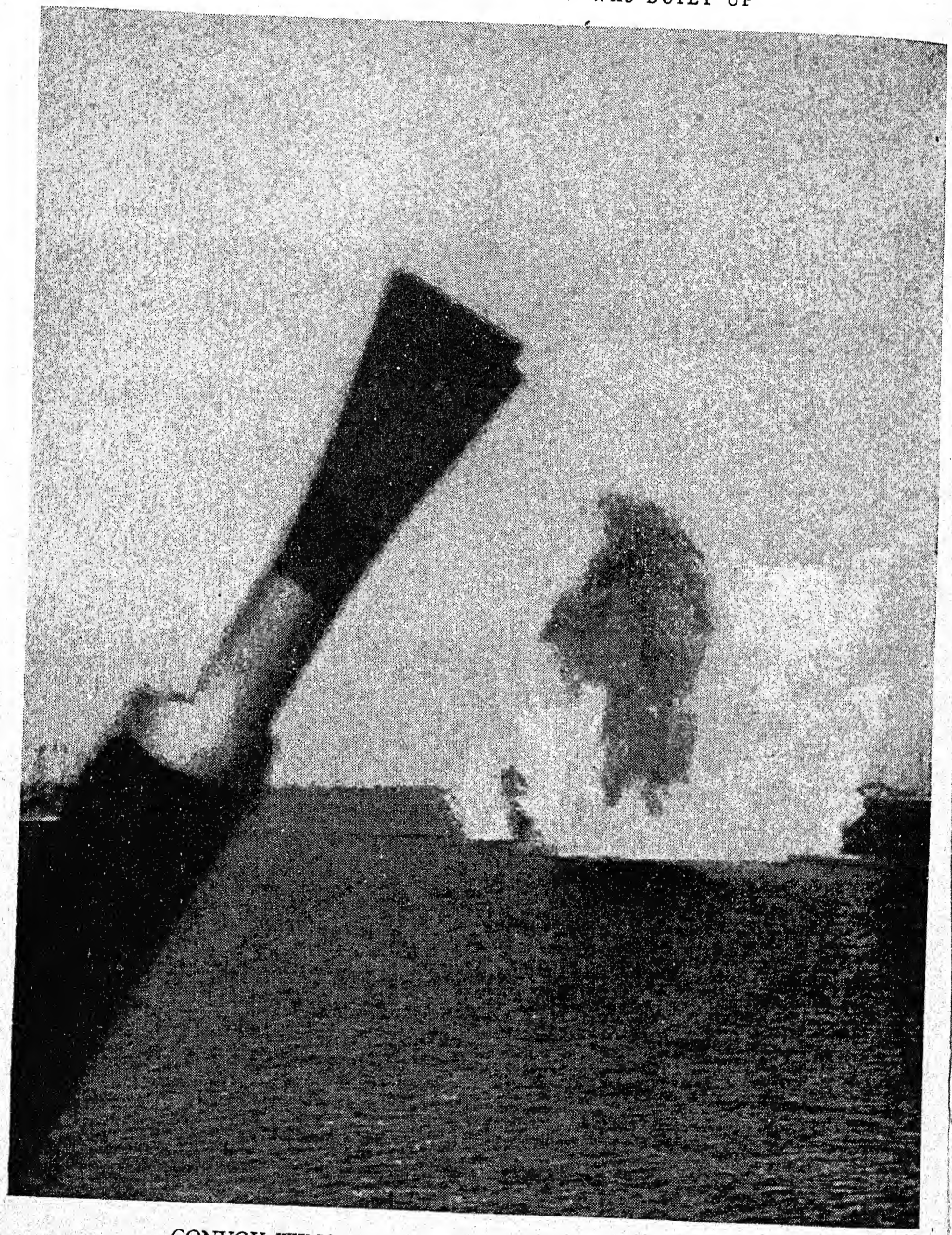
The tramp shipowner evolved an ingenious system by which he might become the owner of a ship—the sixty-four system, each ship being represented by sixty-four shares. Some shipbuilders built ships and set up managers to own them, retaining a mortgage on the ship until the instalments were paid. Throughout the country districts men were told of the profits which could be made in good times on sixty-fourth ships and freely invested their surplus profits in shares.

Down to about 1885 there were probably fewer than a dozen limited liability companies owning tramp steamers. When bad times came the "Sixty-fourthers," as they were commonly known, instead of receiving handsome dividends, found themselves liable for large calls. In consequence a new era opened when a shipowner conceived the idea of turning the ownership of a single vessel into a limited liability company. This development was popular, and the practice is still frequently adopted.



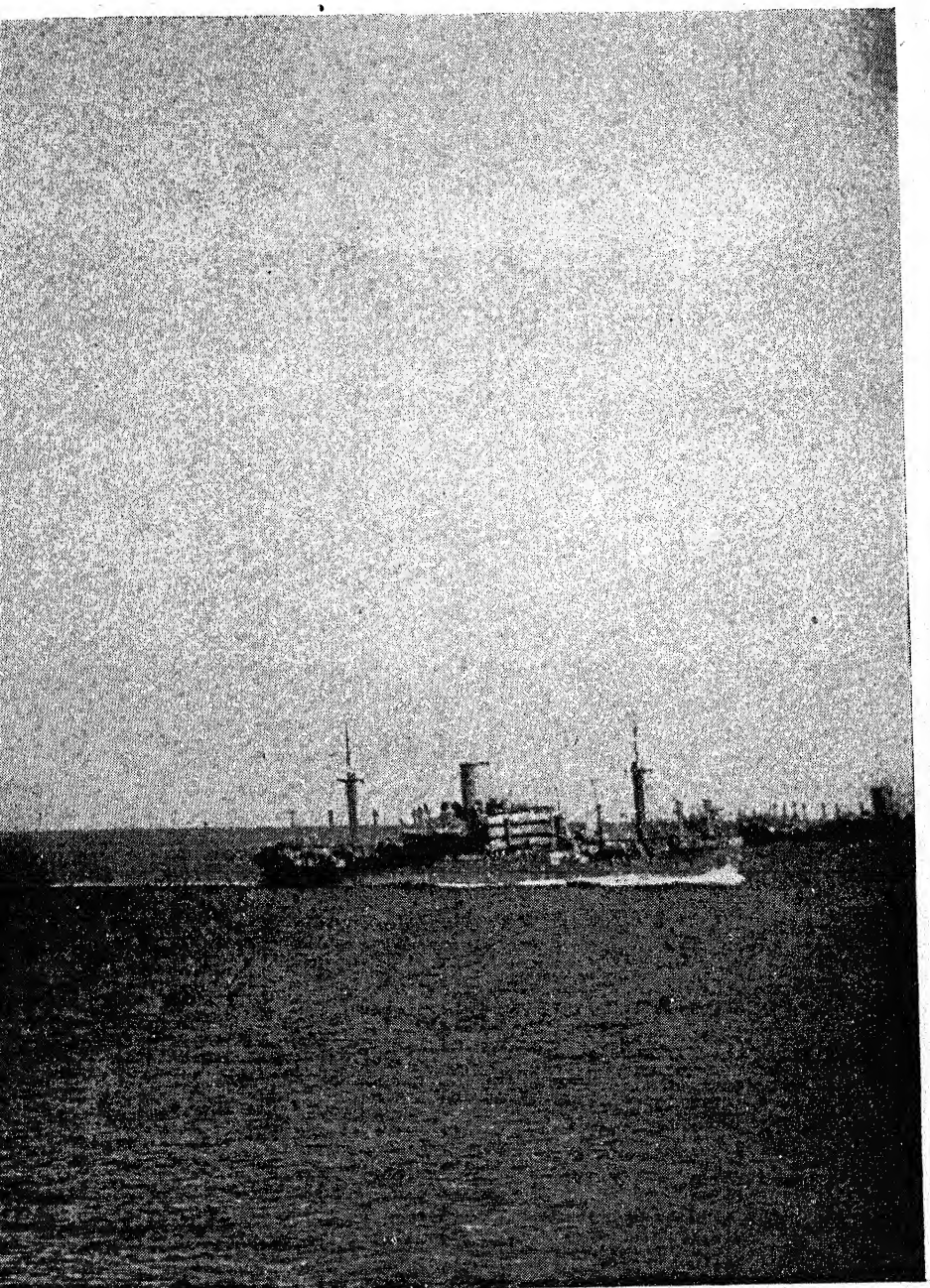
LIFEBOATS LOWERED BY GRAVITY AND QUADRANT DAVITS

When the lowering brake is released, gravity davits slide down an inclined way. They then come to a stop and the davit arms swing outwards to hold the lifeboat in the correct embarkation position, ready for lowering. Quadrant davits (inset) bring the lifeboat to lowering position by the use of a hand screw. Hand davits of the old gooseneck type are now becoming obsolete



CONVOY WINS THROUGH TO MALTA DESPITE CONTINUOUS

A salvo of bombs falls harmlessly between two of the ships of a big convoy for Malta. In the foreground are anti-aircraft guns of one of the escorting warships which forced a way for



ATTACKS BY E-BOATS, BY SUBMARINES, AND FROM THE AIR

the vessels in their charge. Enemy attack was relentless for several days. Two E-boats were sunk, and 66 Axis aircraft certainly destroyed. We also sank two enemy submarines

The secret of the success of the tramp was individualism—the thrift and enterprise of one man. When a young sailor, who had taken his master's certificate, decided to become a shipowner, he issued no prospectus inviting investors to come forward with their money. He would save all he could while serving at sea and then buy a second-hand ship, usually when there was a depression in freights, and the prices of tonnage were low. He might get a few friends to join him in the venture or he might mortgage the vessel to a bank.

ADVENTUROUS SHIPOWNERS

Most of the early tramp shipping companies were formed by "chapel" people, and especially by those who belonged to the Methodist chapels on the North-East coast, in Cornwall, and in Wales. They were thrifty men and women, and when one of the congregation who had made the sea his calling had gained their confidence, they would entrust him with their savings for investment in his first ship.

If he was fortunate in his trading, he would either use his savings to buy another vessel or would pay back the money which had been lent to him for the purchase of his first vessel, and then await the time when, out of his own pocket, he could pay for another. In this way many a tramp fleet was established.

By hook or by crook the aspiring owner would provide the necessary funds to purchase a ship. He would take command himself and thus make bigger profits than a vessel which was not operated by its owner. And he would continue to educate himself while afloat, and continue to save all he could during every voyage, until he was able to buy another vessel.

Thus he would slowly build up a fleet of tramp ships, always providing out of his earnings reserves against "a rainy day" and other reserves known as "depreciation," so that as each ship wore out he would be in a position to purchase another one second-hand or place an order with a builder for a new one. It was a proud day for the ambitious owner when his wife, or daughter, broke a bottle of wine over the stern of the first ship constructed to his order and not bought in the sale market.

Sometimes if the owner and builder were friends there would be no written contract; the two men would meet, discuss the design of the new vessel, her speed, and so on, and haggle over the price in a friendly spirit. Having reached a figure which the owner considered reasonable they would shake hands on the bargain, and there was often no record of it on paper. By such methods the tramp section of the shipping industry was fostered in a fine spirit of adventure.

The captains and crews of a tramp ship in the Victorian era never lacked adventure, and in spite of the hardships, often including poor food, uncomfortable quarters and small wages, they enjoyed the life. Son would follow father and grandfather to sea. It was the calling they loved.

Most of us are familiar with the sea stories of Marryat, Stevenson, Conrad, Clark Russell and others, but many tramp owners of the last hundred years could tell tales of the sea which, for daring and adventure, and business risk, were far more exciting than those of the novelists.

SAFETY AT SEA

The story of how the British Merchant Navy was built up would not be complete without some account of the "Safety At Sea" movement, which eventually won for British ships the reputation of being the most seaworthy, well designed, well built, well managed, and well manned.

A few years ago Sir Westcott Abell wrote a book on this subject to which he had the courage, derived from a study of statistics of ship losses in the past, to give the title *The Safe Sea.* It is a record of achievement of which the nation may be proud, for Parliament had first to insist on reform,

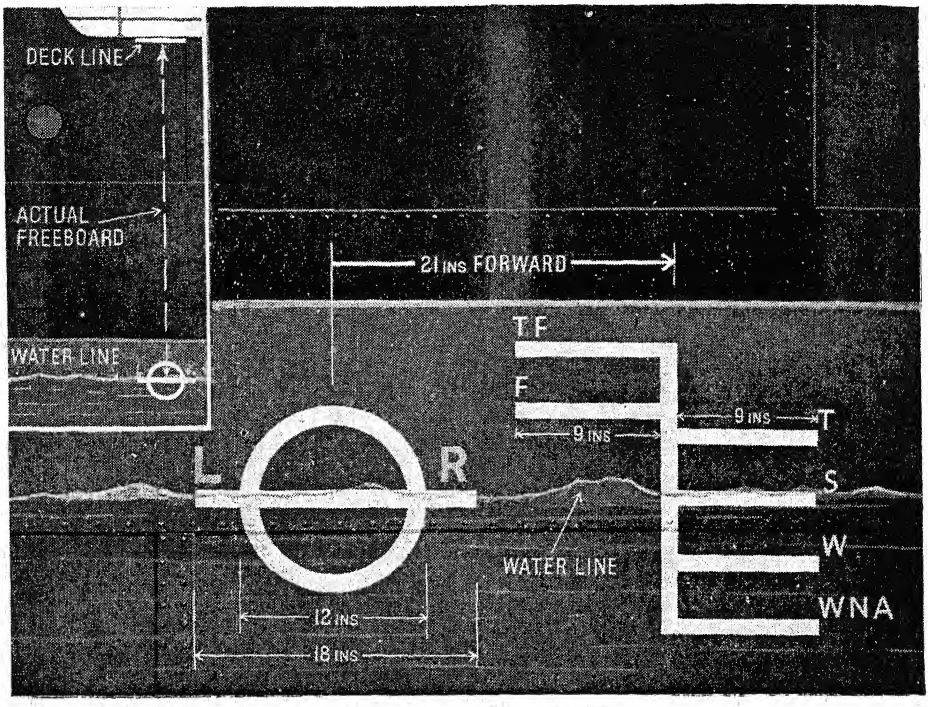
in face of considerable opposition; not all shipowners were conscious of their responsibility for the safety of the lives of the officers and men who sailed in their ships.

As the industrial movement in the British Isles made progress after the close of the Napoleonic wars and this country became increasingly dependent on shipping for its imports and exports, popular

WOMEN HELP WITH THE LIFEBOAT

When a lifeboat of the Royal National Institution was called out to a merchant ship in distress, thirty women of Newbiggin, Northumberland, helped to drag the lifeboat up a cliff and through the sand dunes, fighting all the way against a bitter gale and fierce sleet

interest in the conditions in the important shipping industry very naturally increased. In 1823 Parliament entered on the task of repealing the Navigation Laws; in 1836 a committee was appointed to inquire into the causes of wrecks, which were so numerous as to occasion public anxiety; in 1843 Mr. James Murray, of the Foreign Office, made inquiries of British Consuls throughout the world as to the condition of British shipping, especially in regard to the efficiency of the officers and men, which led to revelations of laxity in the performance of the ordinary duties on board ship. Further legislation was passed in 1846 to ensure greater safety at sea; in 1849 the last remnants of the Navigation Acts were swept away by Parliament; and in 1850 the Marine Department of the Board of Trade was established for the purpose of tightening up the application of the existing laws. In these circumstances the battle for the load line opened; the public demanded action in that direction, and the Govern-



PLIMSOLL LOAD LINE

These lines are cut or painted on both sides of a ship to indicate the depths to which she can safely be loaded in any part of the globe. Initials indicate Tropical Fresh Water, Summer, Winter, Winter North Atlantic. Inset, the actual freeboard of a vessel from the waterline

ment of the day sat on the fence. In the 'sixties, James Hall, a shipowner of Tynemouth, called attention to the large number of ships which were lost at sea, and urged the Government to take action. He prepared the way for Samuel Plimsoll, who, from 1870 onwards, carried on an agitation in favour of a safety load line. He secured a seat in Parliament in 1868—not for a seaport, but for Derby. Having exposed the scandal of overloading and tried, unsuccessfully, to get Parliament to pass a bill which he had drafted for improving conditions at sea, Samuel Plimsoll prevailed, at length, on the Government of the day to agree to an inquiry into the scandal of what he described as "coffin ships."

This Royal Commission exposed the malpractices which were going on and the sufferings of the seamen serving bad owners. A reform bill was introduced into the House of Commons in 1875, but was subsequently dropped, to the chagrin of Plimsoll, who was bitterly disappointed.

But the case against these inhumane shipowners had impressed the country, and a bill to restrain them was passed in the following year. A load line, such as Plimsoll had advocated, was legalized.

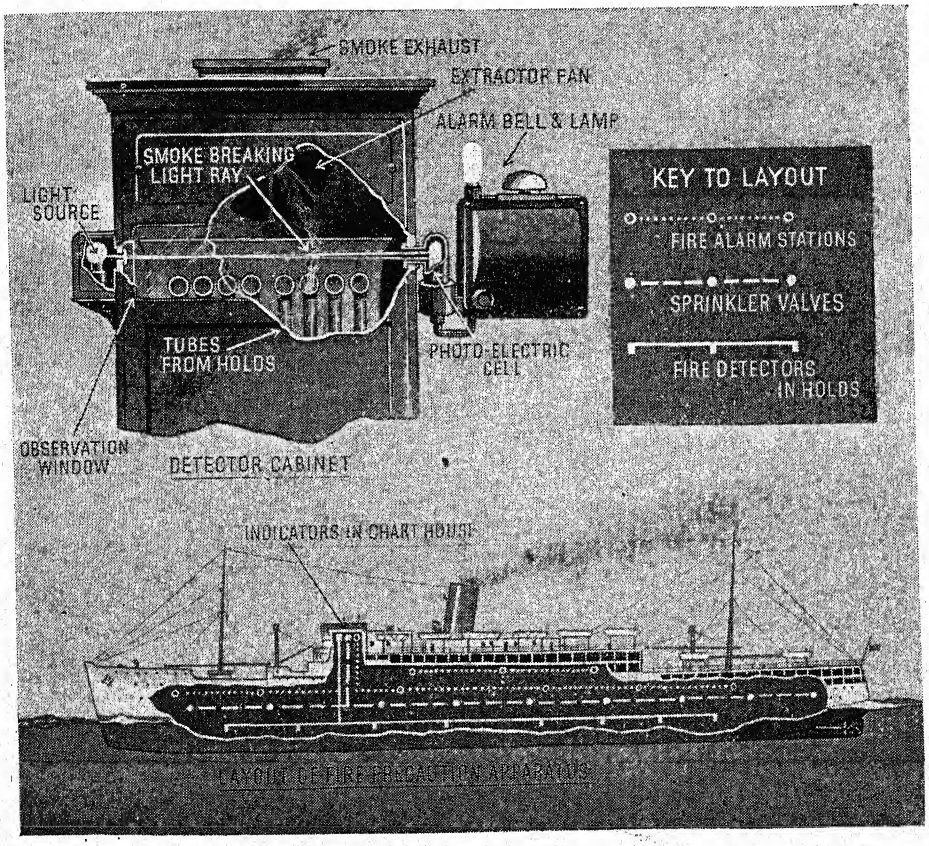
In 1884, at the instigation of Mr. Joseph Chamberlain—then President of the Board of Trade—an amending act was placed on the Statute Book which strengthened the law.

In explaining this measure to the House of Commons, Mr. Chamberlain made it quite clear that he excluded from condemnation the majority of shipowners. In later years the movement to increase

safety at sea owed its progress mainly to the action of what are called the classification societies, such as Lloyd's Register of Shipping, an offshoot of Lloyd's, the greatest marine insurance body in the world, and the British Corporation Register for the survey and registry of shipping. These bodies, on which shipowners, shipbuilders and underwriters are represented, supervise the building of all ships, and thus, apart from the law as administered by the Board of Trade, make doubly sure that a ship's design and equipment spell safety, and periodical surveys keep her seaworthy.

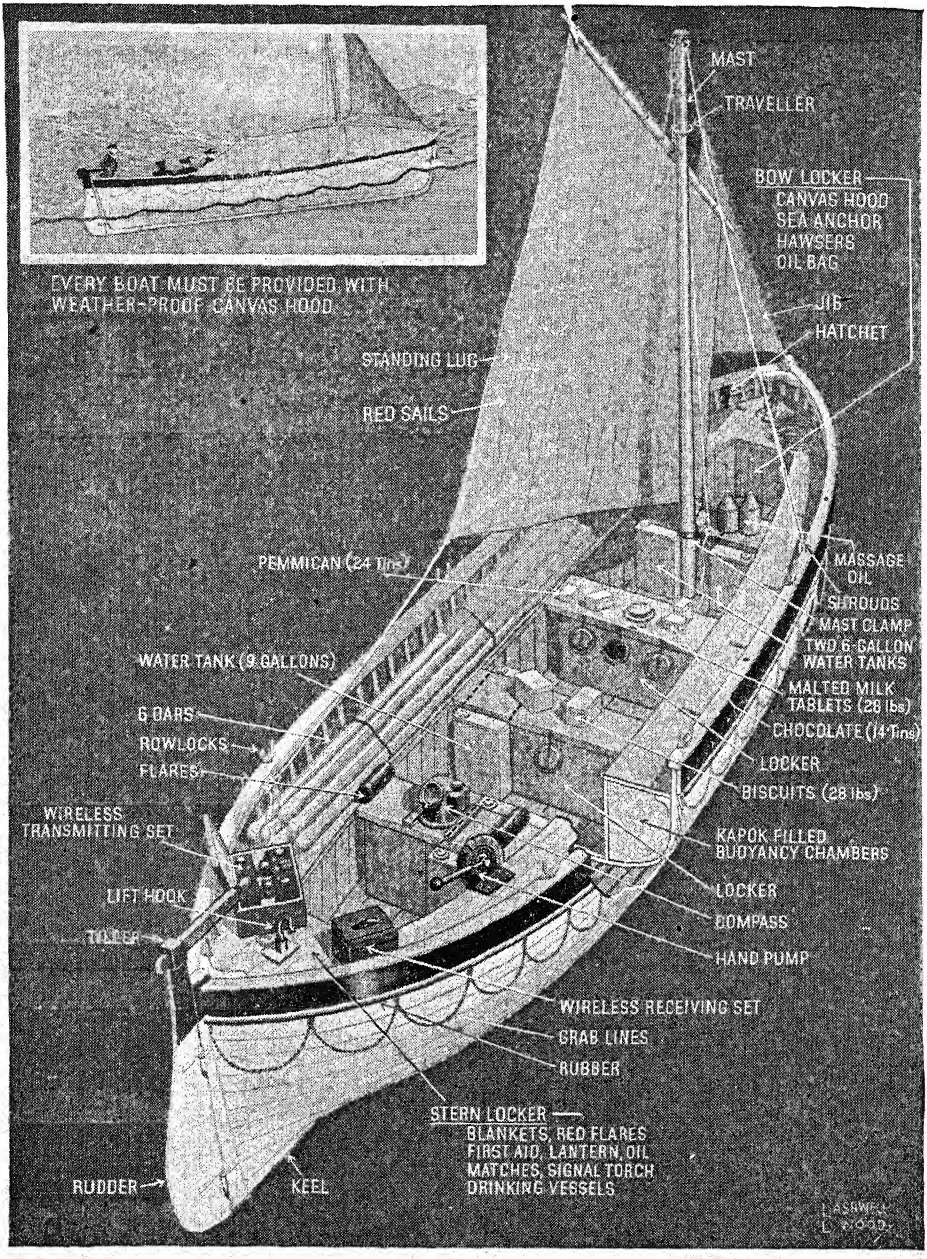
The classification societies, in the interest, not only of the officers and men, but in the interests of insurers and owners, now reinforce the law, and in some cases go far beyond it. The shipowner who acquires a good character owing to the care he takes of his ships can secure better insurance terms than one who is less scrupulous. In this way honesty in obeying the law, and even going beyond its provisions, has become the best policy.

By the action of Parliament and of the classification societies, the sea has been made increasingly safe. Under the



METHODS OF FIRE CONTROL ON SHIPS

The fire detector cabinet is on the bridge (top, left). A fan exhausts air from all the holds and closed spaces through small numbered pipes, and in the event of fire smoke is instantly drawn up and seen through the observation window. A photo-electric cell gives immediate warning of any smoke by breaking a ray which causes an alarm bell to ring and a lamp to light



NEW LIFEBOAT AND COMPLETE SAFETY EQUIPMENT

Many improvements and life-saving devices help the men of the Merchant Navy. Picture shows full details of equipment for ships' lifeboats, in accordance with new Ministry of War Transport regulations. Water tanks contain enough water for a fortnight at sea. Emergency rations of biscuits, chocolate, milk tablets, and meat extract must also be carried

Merchant Shipping Acts, passed between 1894 and 1906, it is compulsory for all British ships, with a few exceptions—such as sailing ships under eighty tons register engaged in the coasting trade, fishing vessels, certain coasting steamers and pleasure yachts—to be marked with a load line in accordance with freeboard tables. The Committee of Lloyd's Register is empowered to administer these regulations.

LIFEBOAT REGULATIONS

The extent to which a ship can be loaded is not always the same. The maximum load line varies: (*a*) if the ship is in fresh water; (*b*) if the ship is sailing during the Indian Summer between Suez and Singapore; or in other seas in winter and summer, there being special winter marking for the North Atlantic. The maximum load lines are by initial letters:

F. ... Fresh water.
I.S. ... Indian Summer.
S. ... Summer.
W. ... Winter.
W.N.A. ... Winter, North Atlantic.

The principal rules applying to lifeboats provide that a ship shall carry on each side sufficient lifeboats not less than twenty-four feet in length, to accommodate every member of the crew, and, in addition, lifeboats of an aggregate capacity to take the total number of passengers the ship is permitted to carry. All lifeboat and launching gear must be kept ready to enable the lifeboats to be lowered without delay.

The launching gear must be of sufficient power to ensure that the boat can be turned out against the maximum list at which the lowering of the boats is possible.

To comply with the rules of the Ministry the equipment of every lifeboat is remarkably complete against emergencies, and all items of equipment not kept in the lifeboat lockers, with the exception of the boathook, kept free for fending-off purposes, must be lashed within the boat. Rations on a specified scale include chocolate, milk tablets, pemmican (or other meat extract), and biscuits. Flare lights, smoke signals, rockets, charts are also compulsory.

Methods of fire prevention and control have been considerably improved.

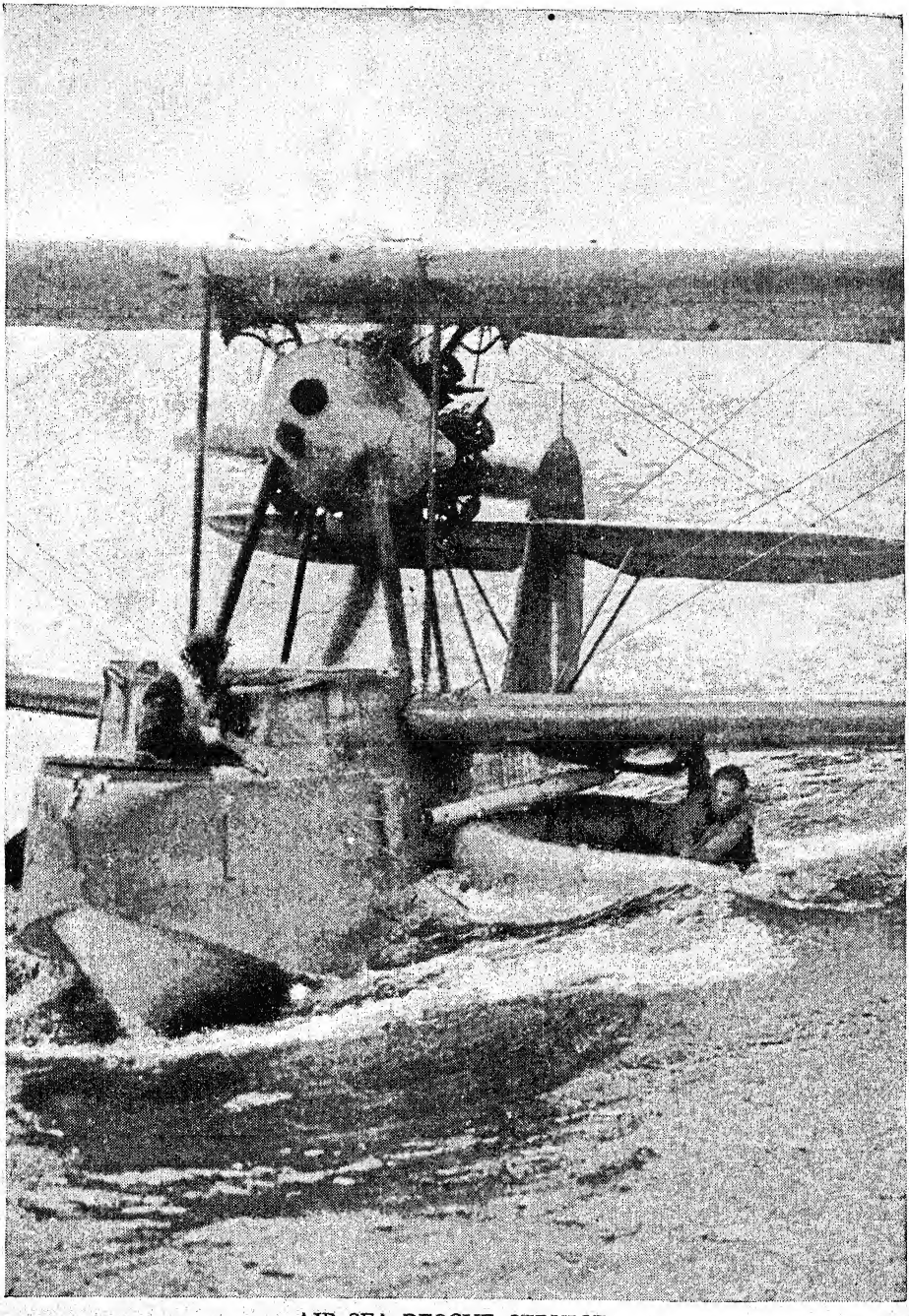
On the outbreak of war in 1939 the work of the Marine Department of the Board of Trade was taken over by the Ministry of Shipping; later, that Ministry and the Ministry of Transport were combined in the Ministry of War Transport, dealing with all transport by land and sea.

In the course of years the casualties at sea, in peace time, have been greatly reduced, and there has been a consequent saving of life—of seamen as well as passengers. Between 1890 and 1913—that is, on the eve of the first World War—the rate of loss from all causes fell by nearly one half. Though later statistics have not been examined, it is known that the improvement has since continued, partly as a result of the more general adoption of wireless telegraphy in all but the smallest ships, and the fitting of direction-finders and depth-sounding apparatus, and partly owing to the provision of more lightships and buoys on the coasts, and of more lifeboats and seaworthy rafts for ships.

MAXIMUM SAFETY THE AIM

There will be no turning back in respect of the provision of wireless equipment, better lifeboats and more efficient life-saving appliances in the endeavour to secure the highest safety for our seamen.

It may be claimed that it is now safer under peace conditions to make a voyage on any of the Seven Seas in a British ship than to cross a crowded street in a great city, with its buses and motor cars. In 1937 the lives lost through wrecks at sea were only 134; 131 seamen and 3 passengers. In the same year no fewer than 6,633 persons were killed on the roads of Great Britain; in London alone the number who lost their lives was nearly 1,000.



AIR-SEA RESCUE SERVICE

In his rubber dinghy, hanging on to a Walrus amphibian aircraft, a pilot is waiting to be picked up. Launches and aircraft work together in the rescue of airmen forced down on the sea

CHAPTER 11

Battles Against Great Odds

Germany's savage war on merchant ships. "Sink at sight." Gallant fight of the "Rawalpindi." Tricks of enemy raiders. Heroines under fire. Great work of Merchant Navy gunners. How the "Jervis Bay" saved a convoy. Duels with submarines. H.M.S. "Cossack" sets British captives free. "City of Benares." Rescues by aircraft. Adrift for seventy days.

Less than twelve hours after war was declared in 1939, Germany broke the agreement not "to sink or render incapable of navigation a merchant vessel without having first placed passengers, crew and ship's papers in a place of safety." Her first victim, the passenger liner *Athenia*, sailing from the United Kingdom to Canada, was torpedoed without warning when 200 miles from land. Americans were among the passengers.

The submarine came to the surface, fired a shell and left passengers and crew to their fate. More than a hundred were killed or drowned.

The Germans declared to the world that Mr. Churchill, then First Lord of the Admiralty, had had the liner torpedoed in order to create tension between the United States and Germany. The British Government answered this impudent propaganda by assuring the United States Government that the *Athenia* carried no guns, either as cargo or as armament, and that she had not been sunk by British mine, submarine, or destroyer.

It was soon evident that German submarines were operating on stations so far from home waters that they must have been sent out some time before war was declared. British merchant ships, on their peaceful errands, were scattered far and wide on the Seven Seas at the outbreak of war, and twenty-one vessels were lost in a couple of weeks. Neutral countries also suffered; a Belgian ship was sunk near Weymouth—it was believed, by a mine. The ship was cut clean in two. No British mines had been laid in this spot. If the cause of sinking was a mine, Germany had again violated International Law by not notifying the laying of a minefield.

In the weeks that followed German mines caused grievous loss to neutrals. By November five Dutch ships had been sunk, including the *Simon Bolivar*; and the British Admiralty suggested that the mine which sank the ship had been laid deliberately in the fairway used by neutral shipping. Among the survivors were several children and babies. A father saved his three-year-old daughter by putting her in an open box, which had been part of a deck game. As he swam behind her, the child asked: "Are we going to Trinidad in this, daddy?"

British minesweepers set to work, and drifters were called on to help in this dangerous job, with 2,000 volunteers, who were mostly fishermen, to man them. Then three months after war began, there came news in one weekend of sinkings by mines of Swedish, Norwegian, Danish, Italian, Lithuanian and Yugoslav ships. Protests from these neutrals did nothing to minimize their danger.

British merchant shipping also, of course, suffered. Day by day stories were published of British steamers sunk.

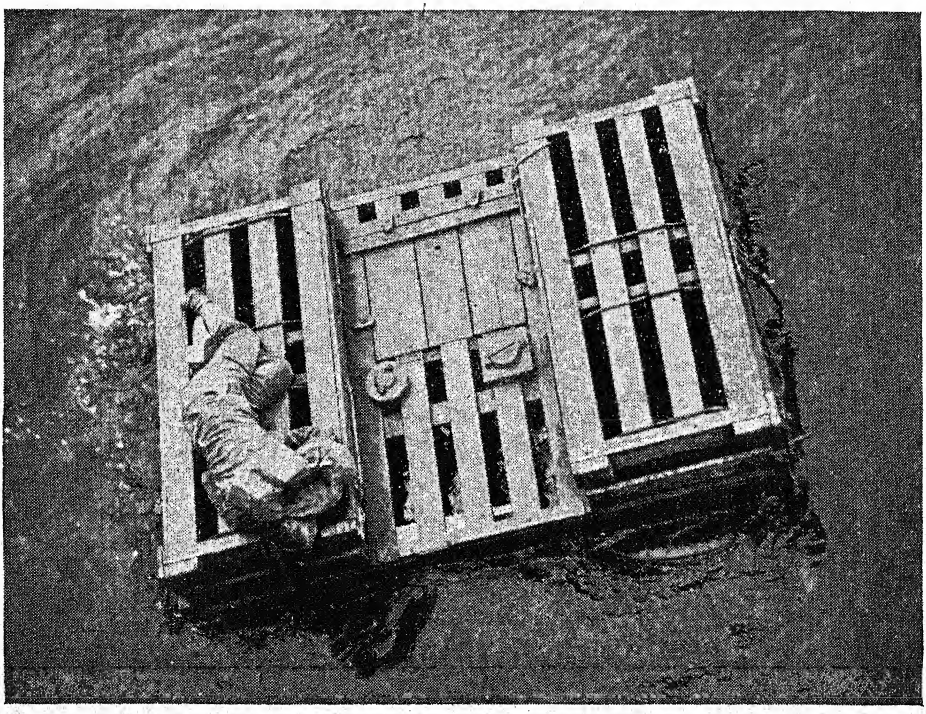
Sometimes just the bare statement: "The British steamer *Kennebec*, of 5,548 tons, has been sunk by submarine. Her crew was picked up"; or, more fully: "The captain and crew of twenty of the British steamer *Goodwood*, which was attacked in the North Sea, have been landed by a fishing boat which picked them up out of the water. The captain is in hospital with both legs broken."

There were personal stories like the narrative of a seaman from the Atlantic:

"In the last war, I was in the Merchant Navy and I knew what being attacked was; I was in a ship that was mined, in one shelled, and in one torpedoed. I hope to be in another ship in less than a month. We first sighted the submarine not less than a hundred yards away. It fired twice with its gun, so the captain ordered us to abandon ship. We got our officers and crew away in the ship's boats.

"The submarine commander got impatient and fired again. The submarine came closer to us, and the commander spoke in perfect English to the captain. He said: "I am going to sink your ship, captain. Goodbye !"

"Sink at sight" with no warning, was Germany's policy and practice from the start. The second month of the war saw the sinking of the British liners *Yorkshire* and *City of Mandalay*. Some 300 were rescued by the American vessel *Independence Hall*, which, *en route* to help the



BATTLE OF THE ATLANTIC—PORTRAIT OF A SURVIVOR

This man is a survivor. He lies helpless and unmoving on his raft, unconscious through exposure to the bitter winter cold of the North Atlantic. He is one of the crew of a large merchant vessel sunk by submarine attack 160 miles off the coast. Ninety of his comrades lost their lives

FLYING BOAT SAVED TWENTY SEAMEN

This ship's lifeboat, crowded with twenty survivors, was 150 miles from land when an R.A.F. Sunderland flying-boat spotted it. The captain of the Sunderland signalled assurance of help and eventually succeeded in calling up a French vessel to rescue the men in the lifeboat

Yorkshire, received an SOS from the *City of Mandalay*. One of the passengers on the rescuing ship describes the scene:

"We were at dinner when the steward informed us that we were approaching the *City of Mandalay*. A terrible spectacle confronted us. From the deck we saw the doomed steamer sink into the sea.

"There were four small boats packed to sinking point. Men were swimming in the sea, and we heard the cries of children. The officers of the British ship were sublime. Only two of them escaped; all the rest went down with their ship.

"One officer, who was saved, was the last to jump from the *Yorkshire*. He was caught in the suction of the sinking ship and was then shot out of the water. He was the last person to be rescued." In these early days a few submarine commanders followed the traditions of the sea. The captain and officers of the British ship *Truro* were taken aboard a U-boat and given the alternative of indefinite captivity or signing an undertaking to keep off the sea for the duration. They chose the latter course and were turned adrift after being provided with cigarettes and twenty-four bottles of beer!

Another German submarine which sank a British ship in the Atlantic had a considerate commander. Bread was handed out to the sunken ship's crew. They were given bandages for the injured, and an SOS was sent giving the position.

The Lifeboat Service was busy. In September, 1939, the Royal National Lifeboat Institution launched its boats fifty-two times, saving nearly 200 lives. During thirty-five months of war the Institution's lifeboats were launched to the rescue 2,531 times, saving 4,772 lives. For continued and valuable work in aiding the rescue of airmen compelled to

force-land in the sea, the Institution received the thanks of the Air Council. But the chief help of the Lifeboat Service was given to the merchant ships, and the Service helped to save from destruction over two hundred boats and vessels.

By January, 1940, over half of Britain's merchant fleet had been equipped with anti-submarine and anti-aircraft guns, and men of the Merchant Navy were being trained to man the guns. This measure brought angry and hypocritical protests from the German press, which claimed that this armament justified merchant ships being treated as auxiliary cruisers. International Law, declared the Germans, does not recognize an armed merchant ship. Germany's preposterous contention was that she had kept strictly to the generally accepted principles of commercial warfare: Great Britain had repeatedly disregarded them!

In fact, British merchant ships were, at this time, armed purely for defence, their guns being placed aft so that they could not fire from an attacking position. A merchantman converted into an armed merchant cruiser was a different matter.

Such was the *Rawalpindi*, which, cruising one afternoon to the south-east of Iceland, sighted an enemy ship.

"RAWALPINDI'S" GALLANT FIGHT

The crew were ordered to action stations. The enemy was indentified as the 10,000-ton pocket battleship *Deutschland*. She was known to have a speed of twenty-six knots, while the *Rawalpindi's* maximum was eighteen. Course was altered to bring the enemy on the starboard quarter, and smoke-floats were lit to help screen the *Rawalpindi*. A second enemy ship was seen, also to starboard.

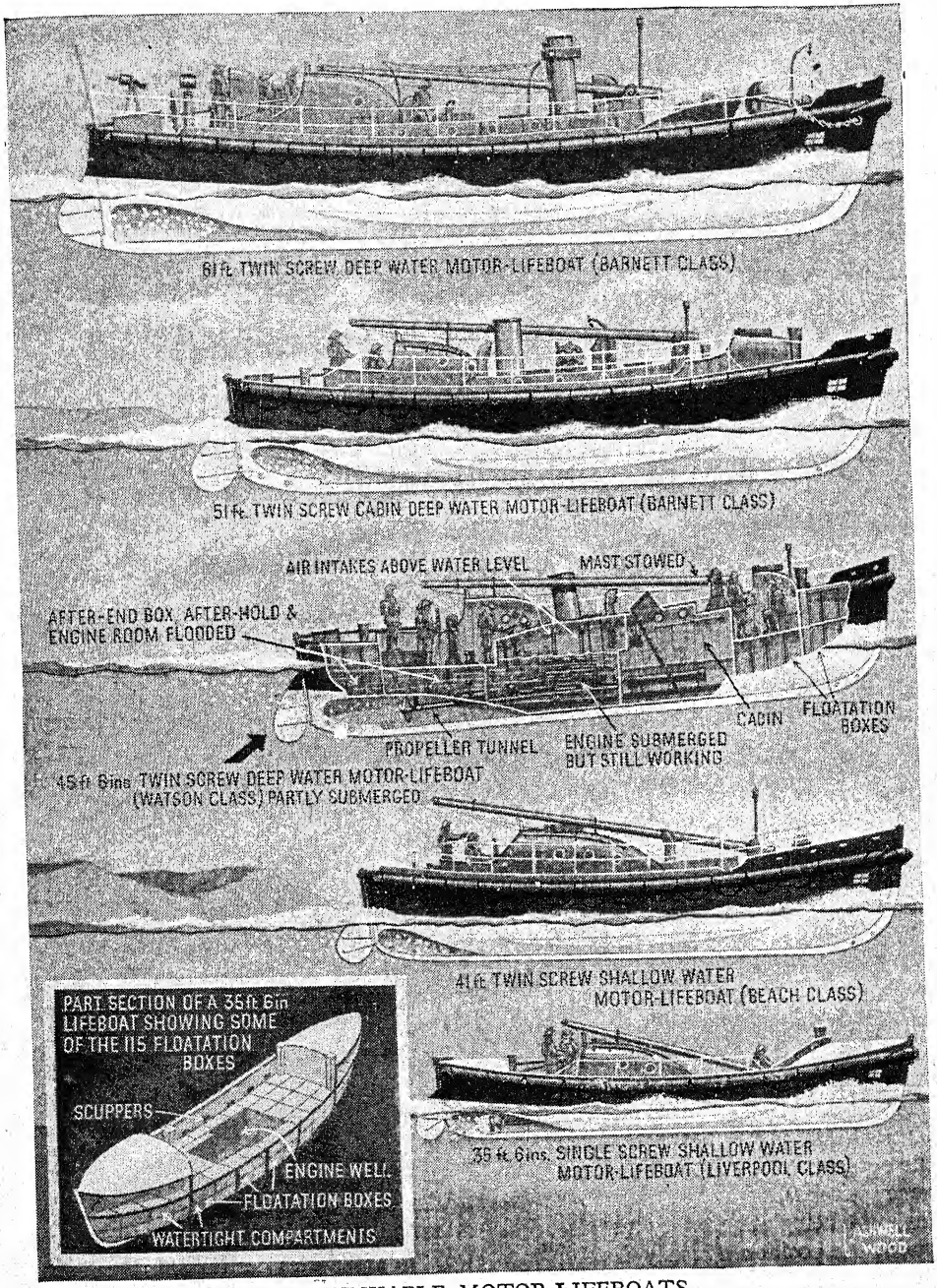
The *Deutschland* signalled to the *Rawalpindi* to stop, and, when she continued her course, fired across her bows. As the *Rawalpindi* ignored the warning the *Deutschland* fired her first salvo from her 11-inch guns. The *Rawalpindi* replied with her four starboard 6-inch guns. The third and fourth enemy salvoes put out all the lights, broke the electric winches of the ammunition supply, and shot away the bridge and the wireless-room. Meanwhile, the second enemy ship had manœuvred round to the *Rawalpindi's* port side and was firing from there. The gallant *Rawalpindi* continued to fight until every gun was out of action, and the ship ablaze.

ENEMY DISGUISES

After about half an hour of this hopelessly unequal duel, the enemy ceased fire, and three boats were lowered from the *Rawalpindi*. Eventually, the British ship foundered, with most of her crew.

The *Deutschland* was of the same class as the *Admiral Scheer* and *Admiral Graf Spee*, and had been operating in the Atlantic for some weeks. She had sunk the *Stonegate* and had seized the American steamer *City of Flint*, placing on board a German prize crew, an incident which set diplomats by the ears. The *Stonegate's* crew were taken on board the *Deutschland*, were given tobacco and cigarettes, and then transferred to the *City of Flint*.

Enemy raiders adopted many tricks of disguise. Some flew a neutral flag. For instance, the German liner *Windhuk*, which acted for a time as supply ship to the *Admiral Graf Spee*, had been refitted to carry the full armament of a raider, her speed being increased, and was disguised to resemble a British ship. The Hamburg-American liner *Cap Norte*, which was captured by the British Navy, had been repainted and renamed, the Swedish flag being painted on her side. The *Leander*, which was also captured, had been masquerading as a Russian vessel; and an American sea captain watched a fight between a British destroyer and a submarine in the Bristol Channel. The enemy submarine was disguised with rigging to resemble a fishing craft. Another raider



UNSINKABLE MOTOR-LIFEBOATS

The many types of modern motor-lifeboats are of two main classes—deep water and shallow water boats. They are launched down slipways, or down a beach on rollers, or from transporting carriages. During three years of the war R.N.L.I. lifeboats rescued 4,772 lives

flew Greek colours when she sank the *Haxby* near Bermuda, taking the skipper on board as prisoner. She also used Brazilian and Dutch colours, and the name and colours of a Swedish vessel, the *Narvik*.

The captain of the *Haxby* reported this raider as an armed liner with six 6-inch guns; she was fitted to enable her to alter her superstructure. Just before the *Haxby* sank beneath the waves the raider covered the Greek colours and flew the Nazi flag.

PACIFIC SINKINGS

U-boats, which could operate 4,000 or more miles from their bases, were the main means of enemy attack, combined with the long-range bombers.

In more distant waters, however, lone merchant ships, with their single gun in the stern and, perhaps, a machine gun or two, were easy prey for the disguised merchant raiders that managed to slip past British patrols—or were fitted out in Japan while that country was still neutral. In the last few months of 1940, German raiders—perhaps not more than two—were able to reap a rich harvest in the Eastern Pacific and Indian Oceans. One French, three Norwegian and thirteen British and Dominion ships were sunk, some after gallant but hopeless resistance. Among these was the *Rangitane*. On her way from Australia to England, she was attacked at dawn.

The captain tried to give a wireless warning, but the raider fired immediately, putting the wireless out of action. The *Rangitane* opened fire, and two raiders, one on each side, turned their searchlights on her. Under the captain's instructions the operators calmly sent over the emergency wireless a message that the *Rangitane* was being attacked by a raider, and giving the position. Already the ship was badly battered, the bridge had been blown away, and there was a fire below. After heavy shelling the captain ordered the engines to be stopped. The glare of the enemy searchlights made range-finding almost impossible for the *Rangitane*. The ship's surgeon worked under fire. Stewards gathered the dead and injured in blankets and carried them to the lifeboats. Six of the forty-six women on board were killed, and another died later.

The *Rangitane's* captain said he had never seen women behave more valiantly, and the raider's captain asked: "Don't you British women ever cry?"

When the *Rangitane* was sunk there were already on board the raider prisoners from several other ships. One of these vessels, the *Turakina*, managed to send the first news to Australia of the raider's presence in the Pacific before her wireless was put out of action. She was armed only for defence, with but one gun aft. In spite of this tremendous inequality she fought for two and a half hours, until she had lost two-thirds of her crew. The raider had trained naval men, her guns had greater range, and she was faster and superior in fighting power in every way. But the *Turakina's* captain kept his vow to fight to a standstill any German vessel that crossed his course.

One of the *Rangitane's* stewardesses received a decoration for bravery. Though wounded, she led people to their boat stations, and cared for them in the lifeboat; it was only when everyone in her charge had received attention that she collapsed, fainting from loss of blood.

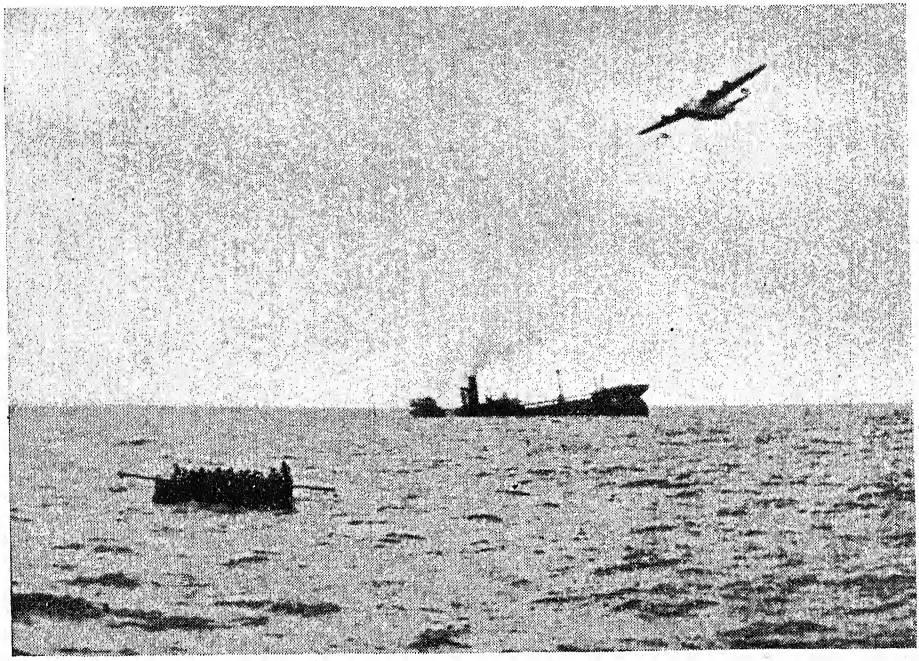
WOMAN SURGEON'S HEROISM

Other women filled heroic rôles in the war at sea. Dr. Adaline Nancy Millar was ship's surgeon on the *Britannia*, shelled by a raider on a voyage to India. Dr. Millar went on deck during the firing to attend to the wounded, and continued her work in a lifeboat after the ship had been abandoned. Her father, who was on board an armed merchant cruiser, heard of the sinking of the *Britannia* over the wireless. After three days of anxiety the cruiser

stopped a Spanish vessel and by an amazing twist of good fortune he found his daughter on board. Dr. Millar was awarded the M.B.E. A woman engineer was also decorated. When her ship was attacked by dive bombers she remained alone in the engine-room, coaxing more and more speed out of the engines, till the ship successfully eluded the enemy.

Navy won fame in these battles, no less than the men of the Fighter Command and the other services. The seamen faced their ordeal with wonderful spirit and determination—and accurate shooting.

Many gunners in merchant ships had old scores to wipe out, and were eager for an opportunity. Second Officer Peter Filcek, of the *Highwear*, had been in a ship

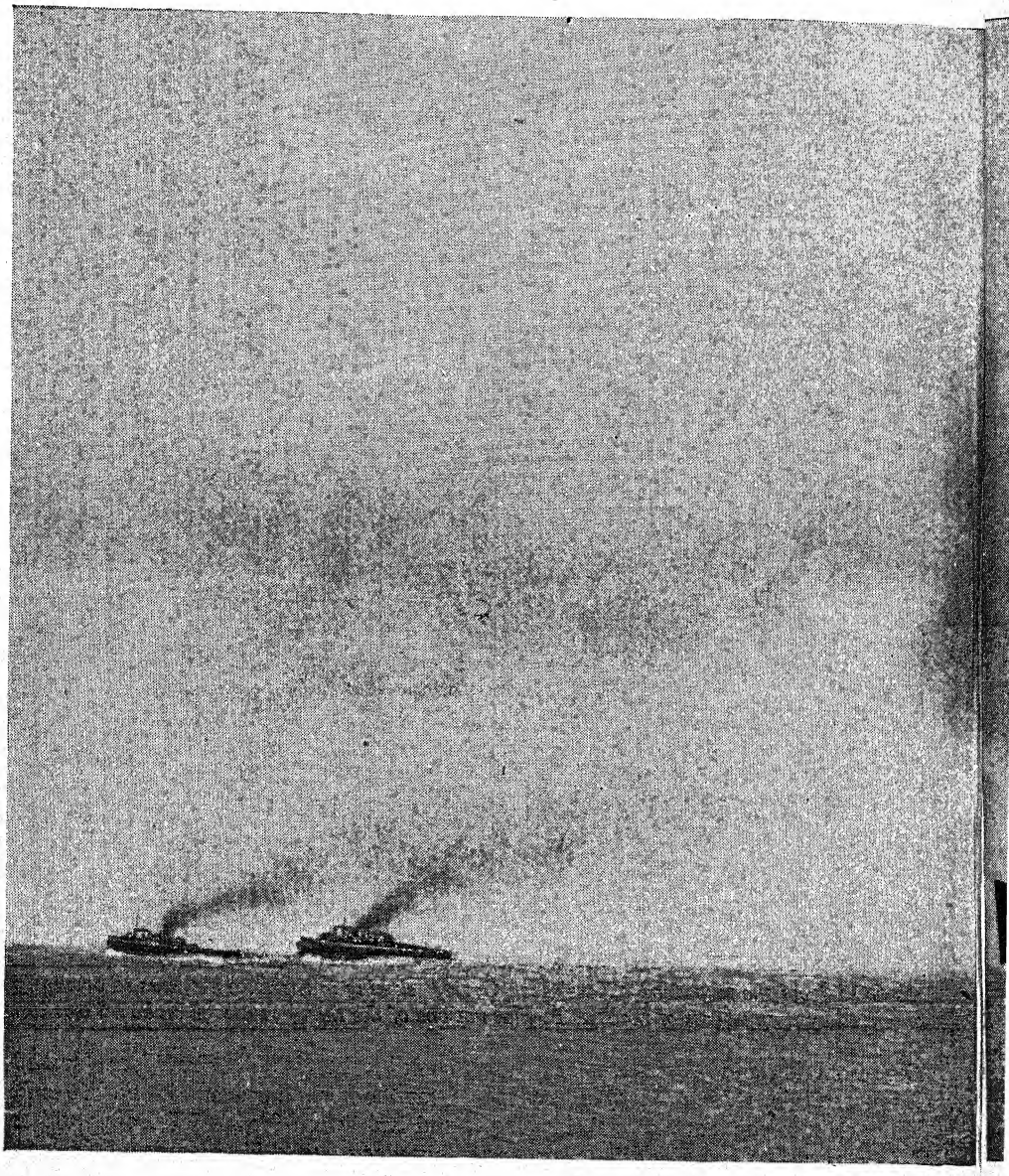


"KENSINGTON COURT" SUNK—ALL ON BOARD SAVED

An SOS from the torpedoed "Kensington Court," sinking in the Atlantic, was so promptly answered by flying-boats of the R.A.F. that not one of the thirty-four men on board was lost

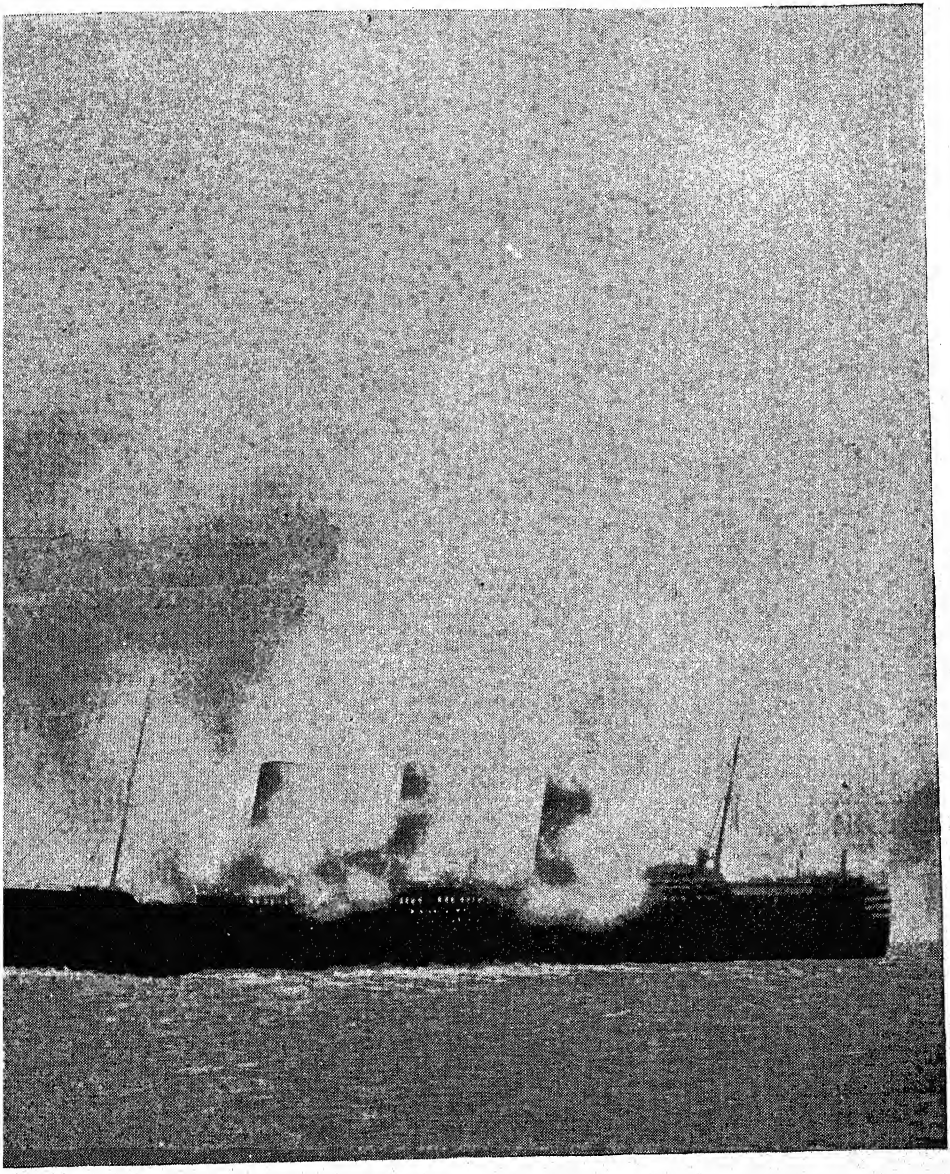
Dive bombing and other forms of attack from the air were a terrible menace both to ocean-going and coastal shipping. Even defenceless lightships were bombed and machine gunned. But during the year March, 1941-42, when 82 per cent of the Luftwaffe's air attacks were made in daylight, the percentage of losses steadily decreased. For this the credit was due, largely, to the Royal Air Force, whose co-operation with naval escort ships protected coastal convoys. The men of the Merchant

sunk by the *Admiral Graf Spee*. He had been for weeks a prisoner in the *Altmark*, and had swum for his life from another torpedoed ship. His ship was sailing in convoy when a Dornier approached. Second Officer Filcek held his fire until the plane was only about 100 feet above the water and at 300 yards range he fired his Lewis gun. The Dornier hit the water, its bombs exploded, and when the spray had cleared there was nothing to be seen. In and out of convoy the stories of



"EMPRESS OF BRITAIN" IN FLAMES AFTER

One hundred and fifty miles off the Irish coast, the "Empress of Britain," 42,000 tons, the chief liner of the Canadian Pacific Company, was attacked by dive bombers, which made direct hits with both high-explosive and incendiary bombs, and left her blazing furiously. Later the great ship was torpedoed, and had to be abandoned. Salvage operations were speedily attempted, and tugs tried to bring her to port. These efforts were unsuccessful, and eventually the liner blew up and sank. There were 643 people on board, including military families and a small number of military personnel. Fortunately, there was little loss of life, 598 survivors being rescued and brought to port by British warships. Captain C. H. Sapsworth, C.V.O.,



ATTACK BY GERMAN DIVE BOMBERS

the commander of the "Empress of Britain," remained with his ship until she sank, and was then rescued. One of the survivors reported that the fire spread so rapidly that boats had to be got away with only a few men in them, in order that they could be safely floated and afterwards pick up the passengers and crew. The "Empress of Britain," one of the most important units of Britain's Merchant Navy, brought their Majesties the King and Queen back from Canada in 1939. Captain C. H. Sapsworth, who stayed on the bridge till it was burning under him, commanded the ship at that time also, and His Majesty invested him with the insignia of the C.V.O. as the liner steamed up the Channel on her homeward journey

courage and cool behaviour were legion. As ships left port and the protection of Fighter Command, they passed into the care of the long-range aircraft of Coastal Command. At sea, men would watch a distant speck. "Is it a Lockheed or is it a Sunderland?" and to quote the words of a merchant seaman, Frank Laskier: ". . . suddenly an idea flashes across the back of your mind. 'My God! It's a Jerry!' And you make one flying dash towards the Hotchkiss and you scream out 'Aircraft attack!'"

About three days out from Australia a ship's crew heard just such an approaching plane. It was flying low, and British markings could be seen. But hanging from it was a wire and plummet. This tore away the ship's aerial. A message dropped on deck ordered the ship to stop and not to use the wireless.

The captain rigged an emergency aerial. The plane returned and began dive bombing and machine gunning. Soon a raider, acting with the plane, appeared and gave chase. There was small chance of escape, as the raider had twenty knots to her victim's twelve. She began firing at close range, and the order to abandon ship was given. The raider took the crew on board.

NARROW ESCAPES

Afterwards they learned that the attack had been made in daylight and by very elaborate methods in an attempt to capture the ship undamaged for use as a store ship. The rigging of the emergency aerial frustrated this plan.

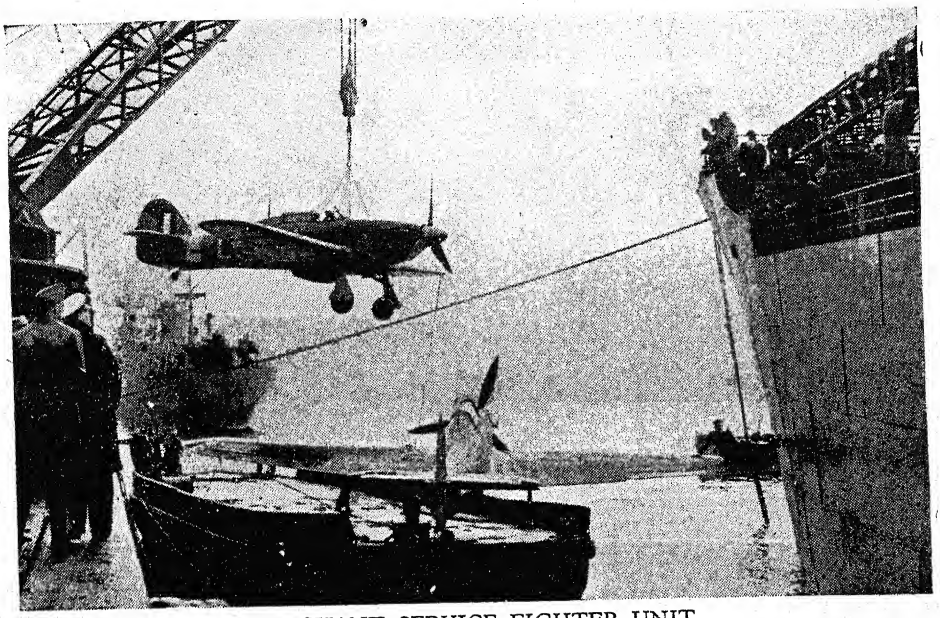
When it is remembered that mighty battleships like H.M.S. *Prince of Wales* and *Repulse* were sunk by bombs, the perils to small merchant ships from air attack are plain. The success of the British Merchant Navy gunners was all the more commendable. The seamanship of the Merchant Navy, too, upheld the highest traditions under the stress of modern warfare. Shooting planes down was not the only way of destroying them. By clever handling, the *Jamaica Producer* contrived to foul a Heinkel with her fore topmast and to send it crashing into the sea. There were no casualties on board, but, when the ship was examined in daylight, it was found that a bomb had passed through the screen of the bridge and through the funnel.

NEW BASES FOR ENEMY

The small steamer *Highlander* had a similar adventure in the North Sea, and destroyed two German planes. Attacked at night by bombs and with machine gun fire, she hit a German plane with her defensive gun, and saw it crash. Two minutes later bombs from another aircraft just missed the *Highlander*, and the ship's gunner secured another hit which caused the plane to lose height. One wing hit a lifeboat, and the impact swung the plane round, smashing it against the poop of the little steamer. The *Highlander* steamed into harbour the next morning with the wreckage still there as evidence. Only two of her crew were wounded.

The collapse of France gave Germany new aerodromes and submarine bases from which to attack Allied shipping. In October, 1940, a big passenger liner was hit by bombs and set on fire. The Canadian Pacific liner *Empress of Britain*, of 42,000 tons gross, was some 150 miles off the Irish coast, homeward bound, when she was attacked and machine gunned. Then a high-explosive bomb got a direct hit; incendiaries started a fire, which drove the ship's company into the boats.

Women and children carried on with great bravery, obeying orders calmly. An eleven-months-old baby was saved by a sailor, who carried the child, tied in a blanket, on his back as he slid down a 60-foot rope into a lifeboat. The sight of a British flying-boat put heart into everyone. It signalled help on its way, and soon warships were taking survivors on board.



MERCHANT SERVICE FIGHTER UNIT

A Hurricane of the Merchant Service Fighter Unit goes aboard its parent ship. M.S.F.U. planes travel on merchant ships in convoy, and are catapulted into action against enemy aircraft

ACTION STATIONS ON ESCORT VESSEL

Keeping their multiple guns at the ready, this gun crew of an escort vessel, clad in oilskins, faces heavy weather and turbulent seas in its work of protecting the convoy against air attack

Captain Sapsworth stayed on the bridge until it was burning under his feet. Efforts were made to save the ship, and she was taken in tow, but some hours later she was torpedoed by a submarine. Revenge was taken on the U-boat, but the *Empress of Britain*, one of the finest liners, sank.

So much courage was shown at sea during these months, and such spirit in adversity was shown on many occasions, that it is difficult to claim that one man's act was more heroic than another's.

The story of the last fight of the *Jervis Bay* will take a proud place in the history of sea warfare. Thirty-eight ships were steaming across the Atlantic in convoy on a November afternoon in the care of a single armed merchant cruiser, the *Jervis Bay*, of 14,164 tons. The weather was fine, with blue sky and some cloud; visibility was excellent. The raider was sighted nearly ten miles away. The commodore aboard one of the merchantmen, the *Cornish City*, signalled to all the ships to alter course away from the raider. Almost simultaneously the enemy fired her first salvo right into the middle of the convoy.

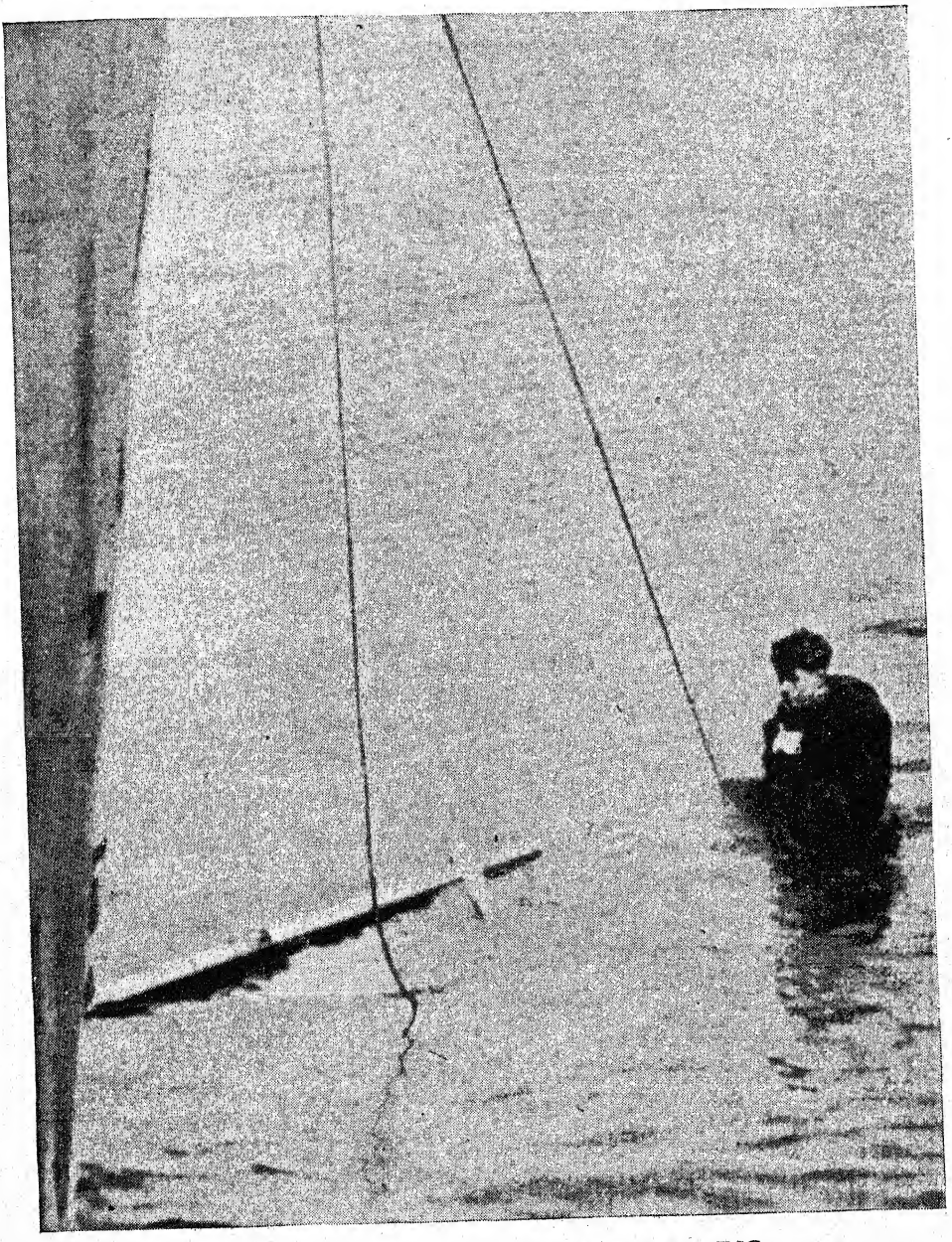
SAVING THE CONVOY

Before she had time to fire again, the escort drew away from the convoy, towards the enemy, and opened fire. A number of other merchant ships within range also fired, and one master claimed two direct hits. The commodore ordered his ships to scatter and put on all speed. One master declared that his vessel, normally capable of nine knots, managed to knock up twelve.

Meanwhile, the *Jervis Bay*, heavily knocked about at the start, partly out of control, and blazing furiously, continued to keep the raider occupied, diverting the fire from the escaping convoy. No one could have known better than Captain E. S. F. Fegan, R.N., posthumously awarded the V.C., and his officers and crew, that they had not the ghost of a chance in view of the superior armament, speed and gun range of the enemy. But the ship's quick action and ready sacrifice kept the raider at bay for nearly three hours. After sinking the *Jervis Bay*, the enemy began to look for the fleeing ships, but was too late. Most of them had scattered to safety. The enemy had been robbed by the armed merchant cruiser of what must have appeared to him an easy and magnificent prize. Only four ships failed to reach port, though for a time Germany boasted to the world of the annihilation of the whole convoy.

EXPLOITS OF TANKERS

Several of the ships in the convoy had desperate adventures; at least one of them is worthy of record. The *San Demetrio*, an oil tanker, was set ablaze by the raider's gun fire, and the crew abandoned ship. But coming across the ship again the next day, the men, who were in one of the tanker's lifeboats, boarded her, although she was white-hot amidships. They fought the fire for eleven hours, determined to save the ship if it could be done. When some sort of order had been produced again and the engines had been set going once more, it was discovered that the compass, which had been shot from the binnacle, showed the Pole star dead astern, while they were sailing east. So they were forced to disregard its vagaries and steer by the stars, and "by guess and by God." "They were bound to hit something between Narvik and Gibraltar," remarked a Canadian soldier. In eight days the *San Demetrio* sailed 1,000 miles. Reaching port, she discharged, through her own pipes, 11,000 out of the 11,200 tons of petrol with which she had been loaded. The second officer, who had captained this voyage, was awarded, with other members of the crew, a salvage claim of over £14,000, and all the costs of the case were paid voluntarily by the shipowners. Another tanker, the *San Casimiro*, was



SURVIVOR WHO COULDN'T STOP PADDLING

Let an officer of the corvette which rescued him tell this man's story. "Having been ordered to proceed to pick up survivors of a torpedoed ship in the Atlantic, we came across this man, who was a gunner in the merchant vessel. He had drifted about on a spar for twenty-four hours. When we got him aboard he could not, at first, stop the paddling rotation of his arms." Survivors of sunken ships often drifted on rafts for many days before rescue came

captured by the battle-cruiser *Gneisenau*. Some thirty Germans, armed with revolvers, hand-grenades, and machine guns, boarded the tanker. They kept a heavily armed guard over the unarmed British crew. The Germans were quite friendly, and expressed surprise at the quantity and quality of the food on board the tanker, as they believed England to be starving; their officer spoke English, and scoffed at the idea that he might not be able to take his prize through the British naval patrols. He said: "There are no British men-of-war on the sea and you know it. Who's going to rescue you?"

He appeared really to believe this was so until facts proved otherwise—a British warship held up the *San Casimiro*, and took him and his prize crew prisoners.

In the grim war of the sea, escorts had more than once to be left to face the odds with little or no chance of survival. A liner bringing some 1,000 R.A.F. pilots, observers, and navigators from Canada had for escort a destroyer and a corvette. A submarine was sighted; it fired two torpedoes, which missed. The third was right on the mark. But before it could reach the liner, the destroyer dashed to the rescue. There was a terrific explosion and debris rained down, and by the time the smoke had cleared nothing remained but oil and bits of wreckage. The liner dared not wait to search for survivors from the destroyer. Only seven were picked up by the corvette.

FIVE HOURS FIGHT

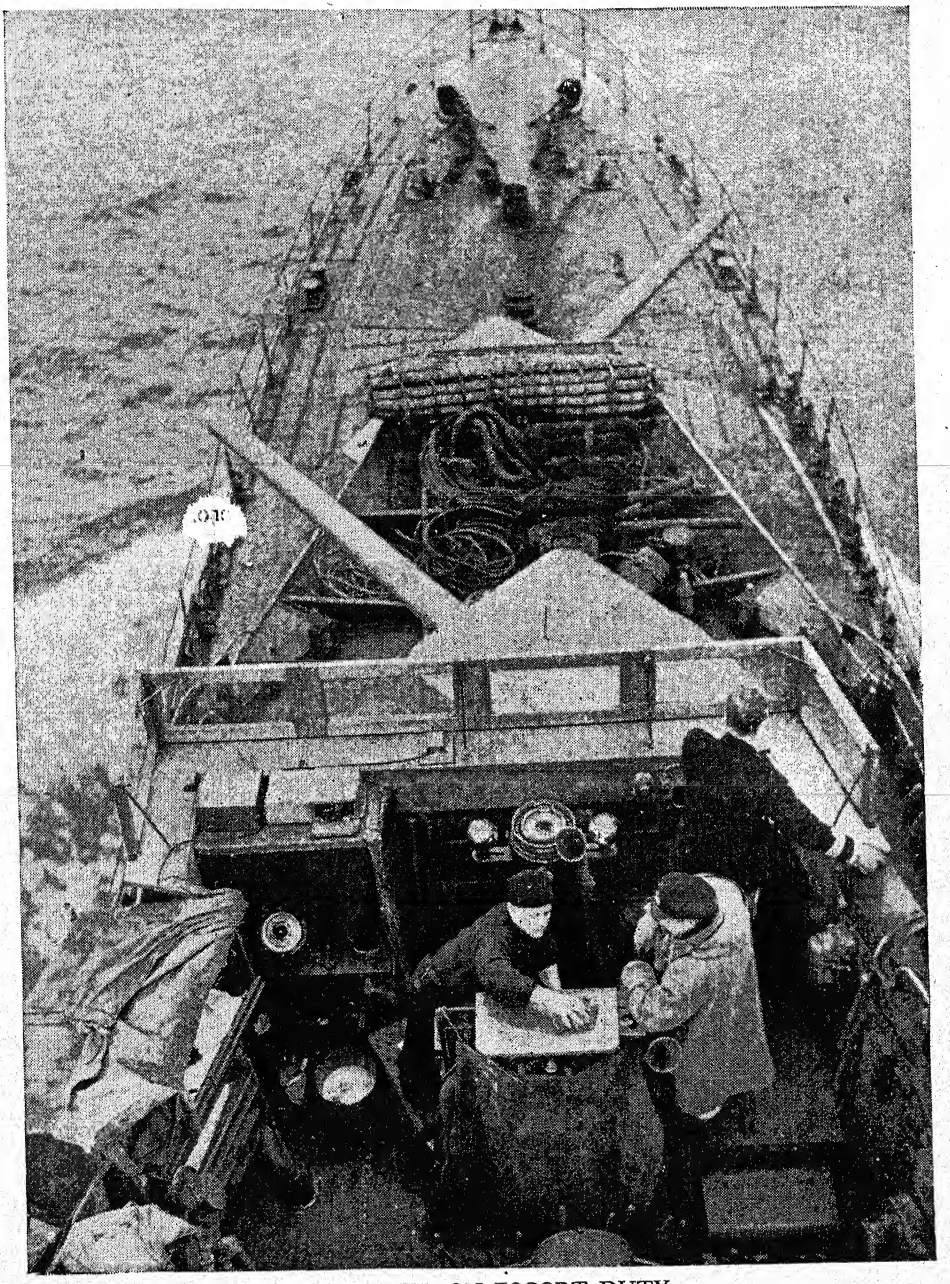
There were many duels between merchantmen and submarines. The *Carlton* fought an Italian submarine in the Atlantic with one Hotchkiss gun for nearly five hours. "The submarine popped up not more than twelve yards away," said one of the crew, who was rescued after eighteen days in a lifeboat. "We turned our gun on her, but the bullets bounced off the hull like hailstones." After zigzagging in an effort to make her escape, the *Carlton* was finally hit and sank in six minutes. Of the men in the lifeboat twelve died. There were only four survivors.

More fortunate was another merchantman sailing astern of a convoy. It was dark and the U-boat was sighted nearby. The merchantman fired her machine gun, and when the U-boat had fired and missed, tried to turn and ram it. Again the U-boat attacked, and this time the defensive gun was manœuvred to fire at almost point-blank range, forcing the submarine to crash dive. Surfacing farther away, the submarine was hit again, and started to sink by the stern. Another shot damaged the bows and the submarine sank.

TALES OF SURVIVORS

Germany's inhumanity at sea, violating all traditions, inevitably brought great suffering to large numbers of voyagers. Many have been the hazardous journeys undertaken in open boats, often in face of storms and severe wintry weather, by survivors of ships sunk by the enemy. Many are the sad tales which the survivors have told to us landsmen of hardship, despair and death. Happily there comes now and then a brighter story of Britain's mighty struggle on the seas. No one will ever forget the thrill which ran through our country at news of the rescue of three hundred British sailors from the *Altmark*. It was such an adventure as Captain Marryat would have delighted in for one of his robust sea novels—a cutting-out expedition in an ice-bound fjord, ships grappled together, an armed boarding-party, the task accomplished, a safe return. It was a great day when the destroyer H.M.S. *Cossack* steamed into Leith, her after part crowded with 299 British sailors whom the Navy had snatched from a miserable captivity.

It came at a time when people were jubilant at the triumph by British sailors over the *Admiral Graf Spee*, then lying a scuttled and burnt hulk at the bottom of



DESTROYER ON ESCORT DUTY

Many destroyers are engaged on escort duty, guarding convoys of merchant ships through Britain's western approaches, to protect them from air, surface, and submarine attack. Here captain and navigator of a destroyer are seen in consultation on the bridge. These ships are fast, and heavily armed—a "Javelin" class destroyer having six 4·7 and several smaller guns

the harbour of Montevideo. It was known that the *Altmark* had served as an auxiliary ship to the *Admiral Graf Spee*, whose captain, after sinking British merchant ships, had detained the bulk of their officers in his own vessel. He turned the seamen over to the *Altmark*, thus using her as a prison-ship. The *Admiral Graf Spee* was alone when she met the cruisers H.M.S. *Exeter*, *Ajax* and *Achilles* in the South Atlantic. The *Altmark* disappeared in the ocean wastes, carrying survivors of no fewer than seven destroyed merchant ships. For almost two months she was lost. Then on February 15, 1940, a British aircraft pilot on reconnaissance sighted her creeping southwards along the Norwegian coast, taking care to shelter within territorial waters.

She had put in at Bergen, where her captain was under obligation by International Law and usage to release his prisoners, and the Norwegian authorities were under obligation to see that they were released. Instead, he kept them concealed, and satisfied the Norwegian officers, who made a very perfunctory inspection of the ship—it cannot be termed an examination. Battened down below hatches, the prisoners set up a hullabaloo, hoping thereby sufficiently to announce themselves. The German reply was to put all the ship's steam winches at work to drown the sound of their shouts.

PRISON SHIP TAKES REFUGE

So the *Altmark* resumed her journey south, fully expecting to reach a German port. She was intercepted by the British destroyer H.M.S. *Intrepid*. Here a Norwegian gunboat intervened, and her commander gave assurance that the *Altmark* traversed Norway's territorial waters by permission, that she had been examined, and that she carried no prisoners. H.M.S. *Intrepid* thereafter had no course but to withdraw; and the *Altmark* took refuge in Josing Fjord. Satisfied that the Norwegian authorities had failed in their duty as neutrals, the Admiralty the same day gave orders that the ship was to be searched, even if it entailed His Majesty's ships entering territorial waters for the purpose, and that the prisoners were to be rescued.

BOARDING THE "ALTMARK"

Captain (now Rear-Admiral) P. L. Vian, in the destroyer H.M.S. *Cossack*, approached Josing Fjord after dark. At its mouth he was met by two Norwegian gunboats. His offer of joint action by both navies to carry out a search of the *Altmark* being rejected, he carried out his orders and steamed into Josing Fjord. It was packed with ice, across which the searchlights played, opening up glittering points of light against the sombre background of high cliffs. Jammed in the ice at the inner end was the *Altmark*.

As the destroyer was drawing alongside, the prison-ship began to work her engines, broke free from the ice, and attempted to ram H.M.S. *Cossack*. By sharply swinging round and by good seamanship the destroyer got clear, and the *Altmark* herself ran aground by her stern. A boarding party of twenty-four men under an officer, with rifles and bayonets, were assembled on H.M.S. *Cossack*, as the destroyer manœuvred to strike the German head on. Touch being made, the ships were grappled together. Quickly the boarders scrambled up the *Altmark's* side, the officer making for the bridge. In a hand-to-hand fight, the gunner was severely wounded; but the fight was brief.

German seamen, among them some put on board as guard from the *Admiral Graf Spee*, got down to the ice over the ship's stern and made their way ashore, where from a low ledge they fired on the British with rifles. This fire was returned with vigour, and two Germans on their

H.M.S. "COSSACK" COMES HOME WITH RESCUED "ALTMARK" PRISONERS

The German ship "Altmark," which had on board as prisoners 300 British seamen captured from ships sunk by the "Graf Spee," tried to get back to Germany with her captives. She was intercepted by the destroyer "Cossack" and took shelter in Josing Fjord. The "Cossack" followed her in, ran alongside and boarded her. After a hand-to-hand fight with the "Altmark's" crew, the "Cossack" released the imprisoned British seamen, and brought them home in triumph. She is seen entering a Scottish port, with the rescued men packed amidships

way over the ice to join the snipers were hit. The German dead were stated by Berlin to number six. Nearly an hour passed before all the Germans in the ship were rounded up. In the mêlée an enemy sailor fell into the sea. Characteristically, two of H.M.S. *Cossack's* officers at once went overboard into the icy water and saved him from drowning.

The captives on the *Altmark* had been thrown into consternation as the ship grounded, the shock sending a shiver through her every plate. At length hatches over the holds were knocked off, and a voice shouted, "Any Englishmen below?"

"Yes," was the resounding answer. Immediately afterwards there came the now historic words: "The Navy's here!" It was the first those below knew of the rescue. A Londoner among them, John Quigley, said afterwards: "We went hoarse with cheering when we heard that. You should have heard our cheer!"

Fifteen hours later H.M.S. *Cossack* was in Leith. The Royal Navy had shown again, as it had shown many times before in its history, that its arm can reach very far out to protect British seamen.

TYRANT OF THE "ALTMARK"

On the *Admiral Graf Spee* the merchant officers were well treated; that is to Captain Langsdorff's enduring credit. The seamen held in the *Altmark* found the order there quite different. Her skipper was a tyrant, as a survivor from the sunken *Doric Star* rightly put it—a man sharing nothing of the chivalry of the seaman's calling, one who took delight in causing misery to those in his power.

The *Altmark* had no fitting accommodation for prisoners, and a company of 299 must, in any case, have taxed the ship's capacity. The hardships they suffered in the eleven weeks confinement which many among them endured, can be imagined. In one compartment under iron hatches, forty-five men were imprisoned together. "It was a filthy place, with no fresh air," said Frederick Thomas, of the steamer *Trevanion*. "We were lucky to get some carpets from one of the cargoes the ship carried, otherwise we should have had to sleep on bare boards. The conditions were terrible, and the Germans took delight in making us as miserable as they could with their heartless treatment."

TEA LEAVES FOR TOBACCO

And that was not the worst. Even an empty oil tank, which had been used for storing oil, was made to do service, a disgraceful place in which to confine living men. Other crowded prisons were shell-rooms and store-rooms, into which the captives were locked. The Germans would not let them see anything.

"We were confined for a fortnight without once being allowed on deck," was the testimony of William Curtis, of the *Doric Star*. "There was very little food. We ate black bread and were given tea. For a long time we got no cold water. Sometimes we got washing water." The prisoners became so desperate for tobacco that they smoked tea leaves rolled in paper.

They tried to send out an SOS. A message was placed in a tin, which was made watertight—a friendly German carpenter providing solder. A miniature flag was attached, and tin and flag were dropped overboard with slop pails. To the men's discomfiture, the attempt was observed. Those involved were imprisoned in the ship's hold for three days, and the carpenter got three weeks confinement.

All that ingenuity could suggest was done by the prisoners to attract the attention of the Norwegians. But these officers were deaf and blind to a remarkable degree. There was yet a chance, if noise failed, for the prisoners had managed to bore a hole through a hatchway, so that they might spy what was going on upon deck. They shouted and blew whistles to enforce notice by the uproar, and the

second mate of the steamer *Ashlea* pushed a home-made Union Jack on a stick through the hole. This, however, a German guard quickly appropriated, and whether it was seen by the inspecting officers remains unknown.

In the last days before relief, conditions were so bad that a few of the prisoners tried to stage a mutiny. The idea was that if the three hundred of them once got above deck they could seize control of the ship; but no opportunity came for a breakaway.

The world which had been thrilled by the story of the rescue from the *Altmark* was shaken with horror at the barbarous deed which sent the children's evacuee ship *City of Benares* to the bottom of the Atlantic. It seemed incredible that any German submarine captain could be found to do it. The ship was 600 miles from land, in a tempestuous sea, at night —conditions which gave small chance to passengers, adult or child, to survive an attack. Without warning, an assassin U-boat fired a torpedo into her side. Most of the children, whose ages ranged from five to fifteen, were in their cots or bunks. The explosion killed some of them outright. Escorts shepherding their charges to the alleyways found the boys' quarters a mass of wreckage and broken glass. A boy lay stretched dead across the floor.

The U-boat was never seen. The darkness, the cutting wind and the cold, hailstorms and drenching rain added to the perils of those compelled to take to open boats. Others from the ship clung to rafts in a tumbling sea, enduring exposure to which, in the night, many

RESCUED ONE BY ONE

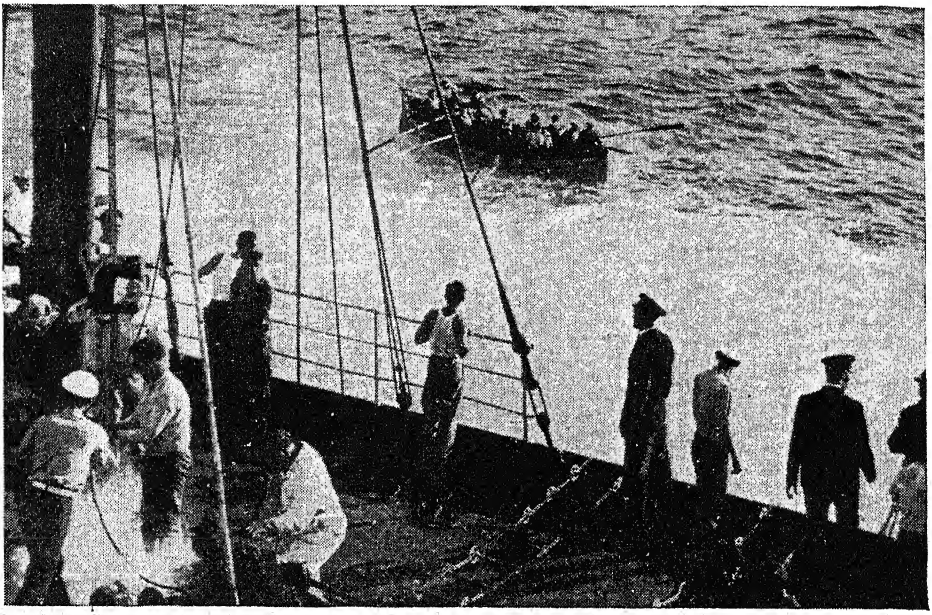
From the rocky cliff men throw a line to survivors of a sunken tanker, whose lifeboat bobs perilously in the surf. One by one all the men in the lifeboat were hauled to safety

succumbed. Boats were swamped and their occupants drowned. The *City of Benares*, a big Ellerman liner, was struck two hours before midnight, and quickly began to settle down. Possibly fifteen to twenty minutes—some said less—were available to get the boats out before she sank. Altogether 421 passengers and crew were carried by the *City of Benares*. She had sailed from a West of England port during the second week of September, 1940. On board were a party of ninety-two children, who were being sent to Canada; seven only were reported saved. A group of five children came from one London family, whose home had been wrecked by a bomb. In charge of the children were nine women escorts, six of whom lost their lives. Adult passengers included Czech, Dutch and Hungarian refugees, among whom upwards of one hundred were missing after the rescue.

Rehearsals on the voyage for just such a contingency proved their worth. Excellent order prevailed. Passengers mustered in the lounge until the evacuee children were on deck and passing into the boats, then they took their stations. Boat after boat was got off with no loss of time, but the heavy list of the big liner added to the sailors' difficulties in lowering them as the minutes sped by, and all could not leave the ship. A survivor thought there were some ten boats on the water when the ship was engulfed.

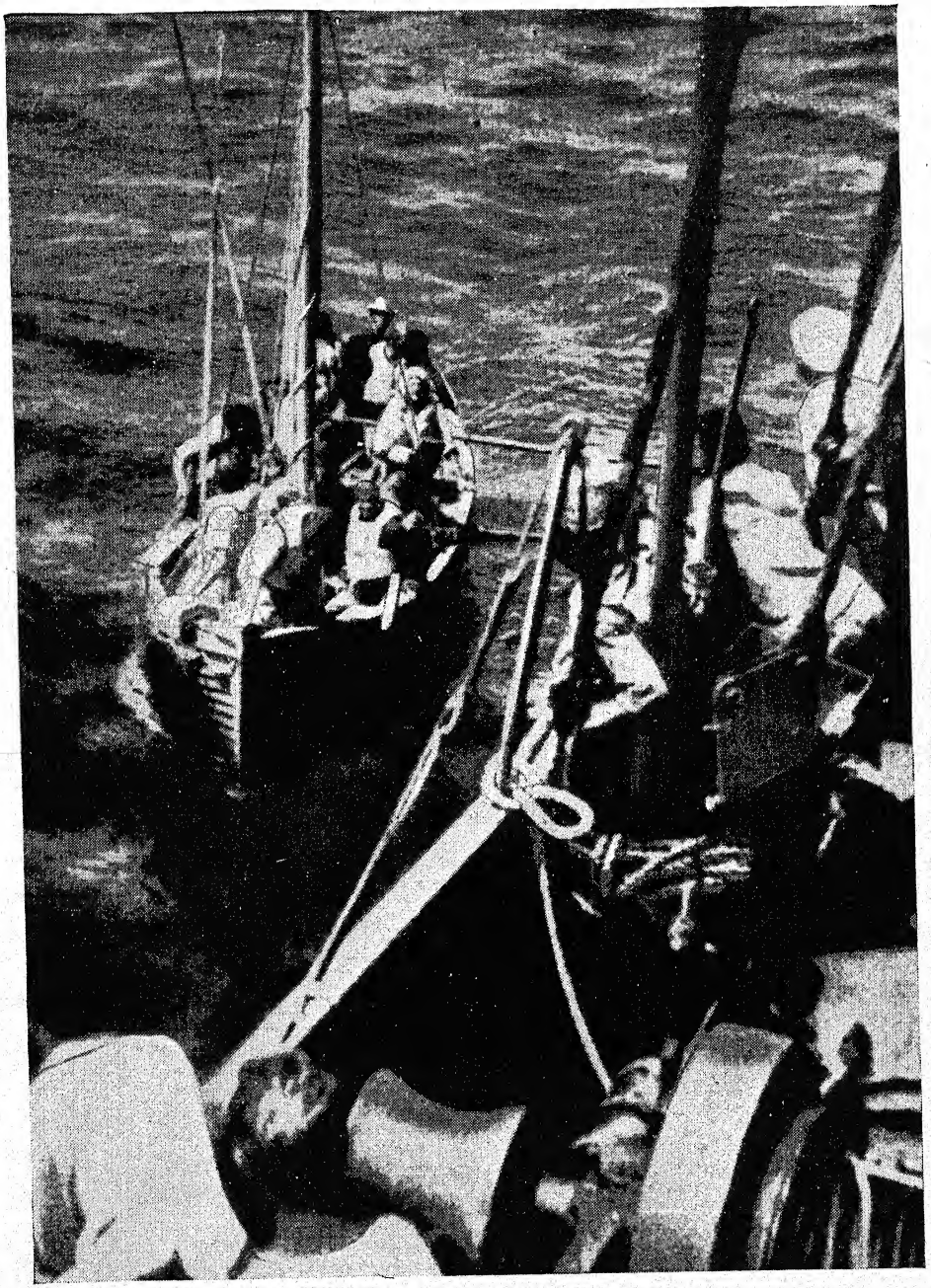
It was nearing dusk next day when a British warship came to the rescue of the widely scattered flotilla of boats and rafts.

Loss of life was, at first, given out as 306 persons, three-fourths of all whom the ship had carried; of the ninety-two evacuee children, nearly all were missing. All hope had gone of other survivors, and certainly no one was prepared for the surprising



MID-ATLANTIC RESCUE

The "Kafiristan" was torpedoed and sunk by a German submarine. One of her lifeboats was swamped in launching, and six men were lost. Others managed to right the lifeboat, which is seen nearing the American ship which rescued over thirty of the "Kafiristan's" crew



SAVED AFTER ELEVEN DAYS ADRIFT

After eleven days drifting in the ship's lifeboats, all the crew of a small Allied merchant vessel, sunk in the South Atlantic, were rescued. Their ship was shelled and machine-gunned for half an hour by an Axis submarine in an obvious attempt to conserve torpedoes

denouement. Eight days after the *City of Benares* had gone down, news was flashed across the waters that another of her boats had been found, containing forty-six of the ship's passengers and crew, including six boys from among the evacuee children. All were well, although much exhausted.

RESCUED BY AIR PATROL

This was a joint air and sea rescue. Just before going off patrol a Sunderland flying-boat of the Australian Air Force, on convoy escort, had noticed the floating boat below. As his petrol was running low, the captain signalled the R.A.F. aircraft relieving him to carry out the rescue, giving the exact position by Aldis lamp. Her captain found the boat, which had hoisted a sail and was crowded with people, all sitting or lying down except the man at the tiller. He came down low, circled round, noticed that the castaways seemed pretty exhausted, then made a signal that he would fetch help. Before leaving, he dropped by parachute all the food the aircraft had on board, tying the bag to a lifejacket to keep it afloat. In time a warship approached, following the returning aircraft, which, after observing the rescuing vessel alongside the lifeboat, made off to join the convoy.

Rescue came just in time, for the boat had no water left, and food was practically gone. The rescuing warship picked up six survivors from rafts. All in the boat suffered severely from cold, but rowing night and day helped the stronger of the men.

By the recovery of this last boat-load of sea-tossed survivors, after they had been mourned as lost, the death roll of what, perhaps, was the Germans' most inhuman act of barbarity on the oceans was brought down to 260, and the loss among the children to seventy-nine dead.

Narratives have accumulated in this war of almost incredibly long voyages in open boats, bearing testimony to the seamen's immovable faith that while there is life there is hope—testimony also to their dauntless determination not to give in.

One boat made a journey of no less than 2,500 miles. Two men survived out of seven who had originally set out in her. A planter upon the island of Eleuthera, in the Bahamas, noticed two figures staggering upon the beach. They were sailors from the British ship *Anglo-Saxon*, which had disappeared when on a homeward voyage, and had long been given up for lost. She had been sunk by a raider.

The survivors knew nothing of the fate of other boats. They had themselves been adrift for seventy days. The boat was provisioned, but food gave out and they kept themselves alive by eating flying fish and seaweed. Rain occasionally fell, and was caught and stored in tins, but on eight days of the long voyage they had been without drinking water. Both men were young, one but nineteen. They had been tanned almost black by the sun. Although they were in the last stage of exhaustion when found, they recovered in hospital in Nassau, to which they were flown.

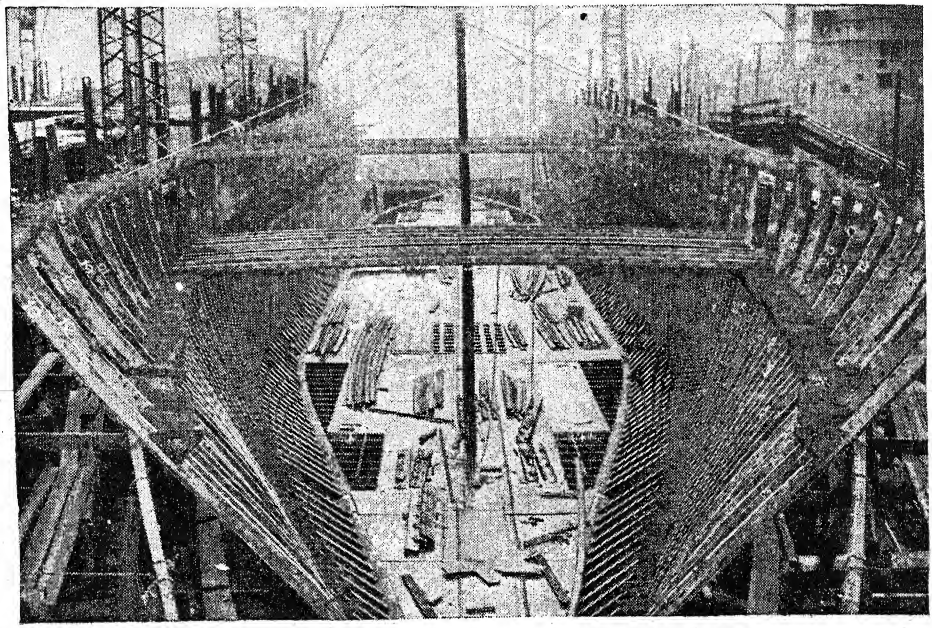
ADRIFT FOR 500 MILES

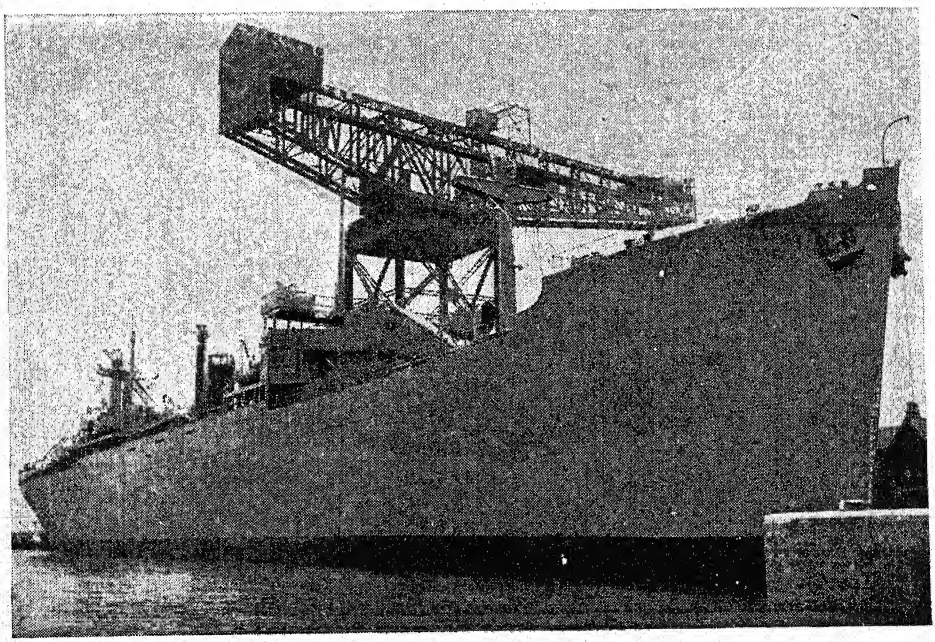
Twenty-nine survivors of a British freighter sailed an open boat to safety for nearly 500 miles upon the North Atlantic, in intensely cold weather. Their ship, outward bound on her maiden voyage, was torpedoed in the middle of the night to the west of Iceland. The crew, numbering sixty, got away in two boats, but they almost immediately lost sight of one another. The boat in charge of Mr. John Cameron, the chief officer, turned back to rescue four men who were dangling from ropes down the ship's side. A few minutes later the vessel sank.

All was uneventful till a strong wind blew up from the east, and a sea anchor was rigged. For five days no real progress could be made, and only unceasing baling kept the boat afloat. Then the wind changed. So matters went along for

MASKED MEN OF THE TANKERS

Crews of British tankers are being supplied with special protective suits of asbestos clothing to lessen danger from blazing fuel. These hoods and gauntlets are flame-proof. All in one piece, they can be slipped on in an instant. Tanker lifeboats are to be equipped with asbestos blankets. In their hooded suits these men are on their way to lifeboat drill. New regulations on equipment of lifeboats and rafts have much improved safety measures for seamen





BRITISH SHIPS MADE IN SECTIONS

Pre-fabricated standard merchant ships are being launched from British shipyards. They are almost entirely made at inland factories, the various parts then being taken to the shipyards for assembly on the slipways. Top, a pre-fabricated ship on the stocks, showing main frame. Below, a pre-fabricated ship in being. This method greatly speeds up ship production

twelve days, by which time some of the men were fully exhausted. Their only food was biscuits, pemmican, and chocolate.

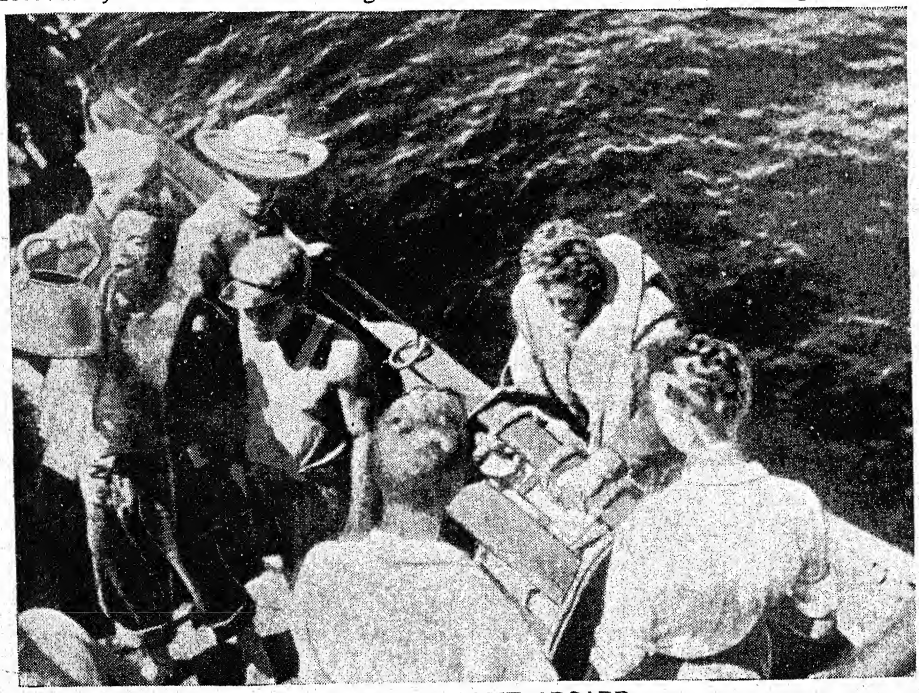
Luckily it rained on and off, so there was no actual shortage of fresh water, though the cold drenching added to the voyagers' miseries. One man died when they were almost in sight of land. On the fourteenth day, when ten miles from the coast, they were sighted by a British plane, which guided an Icelandic trawler to their rescue.

The castaways were placed in hospital suffering from frostbite. Mr. Cameron was the only man in the boat who knew anything about navigation, and to being kept so busy throughout the terrible voyage he attributed the fact that he was not as badly affected as were the others, who recovered, and were soon at sea again.

A vessel of the New Zealand Shipping Company made a run down the Mediterranean, just after Italy had entered the war, which well deserves a place among epic voyages. This ship had the reputation of being " a perfect beast " to handle and manœuvre—even with a rudder.

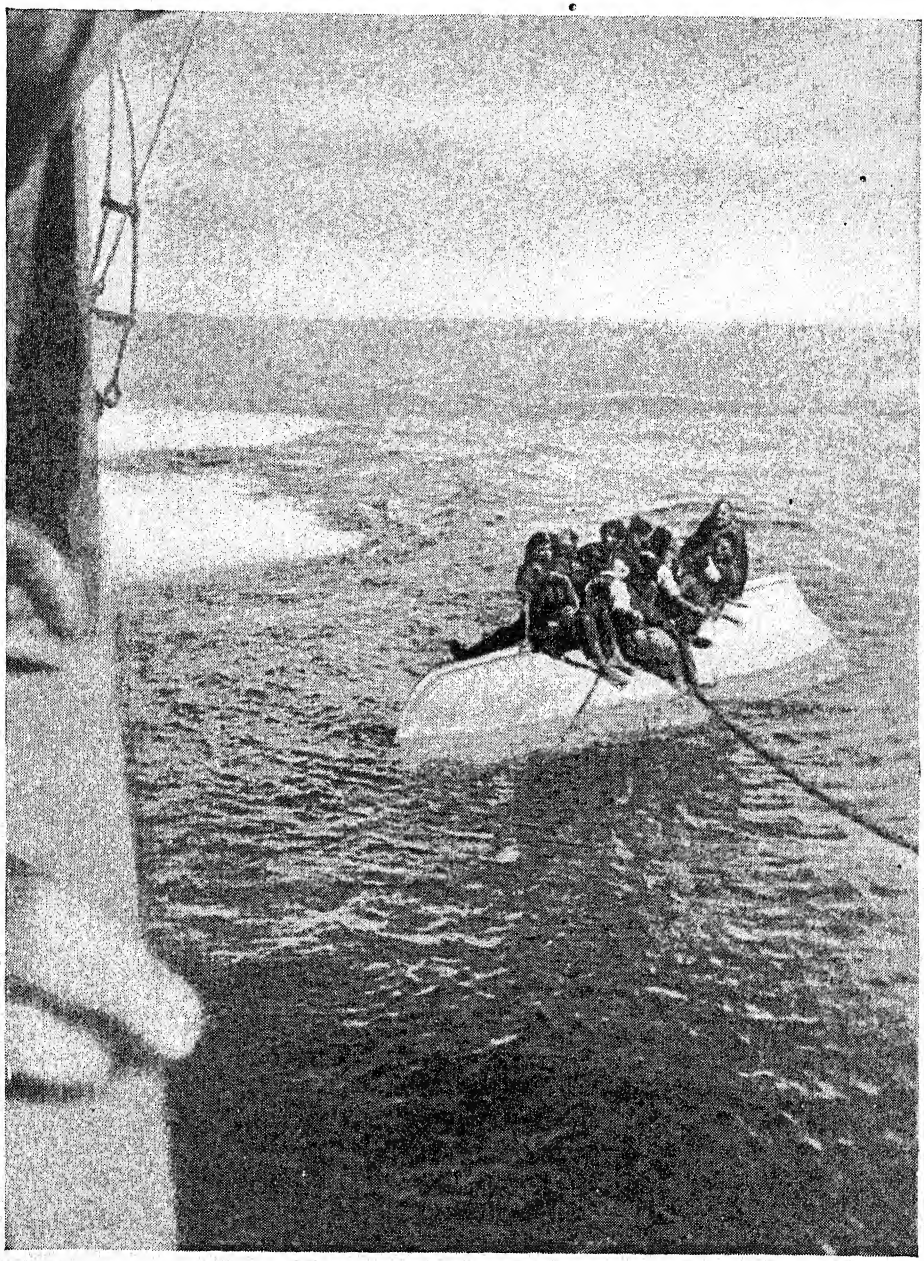
GUNS OUT OF ACTION

She was pushed along 400 miles without a rudder by her captain's and the engineers' seamanship and resourcefulness, dodging attack on the way. It began when she reached Suez, and Admiral Sir Andrew Cunningham, Commander-in-Chief in the Mediterranean, asked her captain if he would accept the burdensome honour of taking his ship to Malta, loaded with much-needed supplies for the island. A couple of high-angle guns were placed on board and off she set, in company with



SURVIVORS COME ABOARD

Safe on board the rescue ship, one of the survivors from a merchant vessel sunk in the Atlantic takes a long drink of water from a tea kettle. Another is climbing up the rope ladder. They were members of a crew of twenty-seven, who were all rescued. Great hardships were suffered by merchant seamen. Two men from another ship endured seventy days adrift before reaching land



ONE OF THE SHIP'S LIFEBOATS IS SAFE

Three corvettes were sent to help a merchant ship which had been torpedoed. All they found was this upturned boat. The men clinging to it were the only survivors. Among them can be seen the Chief Engineer, with his broken leg sticking out. Coastal Command aircraft have helped in many rescues of survivors, and flying-boats have sometimes carried them to safety

two other ships, on her perilous voyage. The risks were great and the onslaught duly came. Italian airmen, flying high, dropped bombs, which fell into the sea. A single plane, more daring, came lower to find better fortune. Its first bomb hit the wireless cabin and killed the operator. A second bomb struck the ship's aft gun-mounting, put out of action the two high-angle guns, and smashed the steering-gear. Thereafter she was defenceless. The airman, returning, had the luck with his last bomb to score a miss right alongside the main injector. Water came into the ship, and had almost reached the furnaces, by the time the engineers were able to stop the leak with timber.

Malta was 400 miles away. More raiders were to be expected, as certainly as the rise of the next tide. They came, and the little company of three ships went through a gruelling time. Fortunately, the New Zealander was a twin-screw ship. Night came, and she carried on, steering by her engines. When the Italians arrived at day-break to renew the attack, they found British forces ready for them on the sea and in the air. Five Axis bombers were shot down, and the others dispersed; they were given no chance of approaching near the ships. Rudderless as she was, and bearing her scars, the New Zealander reached Malta and delivered the needed supplies, as did her companions. The master deservedly received a decoration.

WHOLE CREW RESCUED BY AIR

The entire crew of a merchant ship torpedoed in the South Atlantic made what must have been a unique passage. The vessel (name not disclosed) sank rapidly, leaving thirty-six British seamen, mostly Scotsmen, and twenty Chinese adrift. By good fortune they were sighted by a big Sunderland flying-boat, which came down to the water to make a rescue.

The pilot's first thought was that he could take twelve men who were wounded, and no more. He was asked to take them all. "Very well, we'll risk it," he said; "everybody in." By tight packing as they sat in rows along the floor of the flying-boat's cabin the whole company was eventually accommodated.

The plane had to taxi five miles upon the sea before it became airborne, and after a 200-miles flight to shore all were brought to safety. This incident, which would have been regarded as impossible when the war on shipping opened, well illustrates the debt of gratitude which merchant seamen, in their dauntless fight against the new piracy, owe, not only to the officers and men of the Royal Navy, but to the officers and men of the air.

An R.A.F. Squadron-Leader, forced to bale out, paddled his rubber dinghy for 60 miles—57 hours—before being rescued.

IN THE FRONT LINE

Let it never be forgotten that the British merchant sailor is always in the front line in wartime, and that the front line of war at sea was always active—never still. Day in and day out, he faced the menace of bombs, torpedoes, shells and incendiaries, of machine guns and mines; he was beset from above the water, on the water, and beneath the water. And still there remained the old hazards of the sea: hurricanes, fogs, rocks, and storms. The winter of 1941-42 was especially severe; in the North Atlantic there was "a flaming gale" for months, with often a 75-mile-per-hour wind and nothing much less than 35 miles per hour, and waves anything up to 65 feet high. Cold and frostbite, starvation, madness or death from exposure, and an end with the sharks were often the lot of the shipwrecked sailor.

The odds against the merchant seamen were tremendous. They were unequalled in the history of the sea. But no ship left port undermanned, and few ships, ready for sea, were ever seriously delayed for lack of a full crew.

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